RAILROAD GAZETTE

FRIDAY, MARCH 19.

The New England Railroad Club.

The annual meeting of the New England Railroad Club was held at its rooms in the passenger station of the Boston & Albany Railroad March 10. There was a large attendance. The Secretary, Mr. J. M. Ford, presented his annual report, congratulating the members on the prosperity of the organization at the completion of the third year of its existance. The present membership is 159, a gain of 46 over the previous year. One member, Mr. George E. Boyden, has died during the year. The average attendance at the monthly meetings of the club has been 87, a very large percentage, considering how widely scattered the members are. The secretary stated that the influence of the club is not confined to New England or even to this country, for communications asking for reports of the meetings have been received from Prague, Austria and Paris. In closing, the Secretary acknowledged indebtedness of the club to its various officials and to the Boston & Albany Railroad. Mr. Ford, as Treasurer, reported the finances in a prosperous condition. Cash on hand March 25, 1885, $246, received dues from 147 members, $294; total, $540; expenses, $409; leaving cash on hand, $131.

The committee to nominate officers reported through the Chairman, Mr. George Richards, as follows: President, J. W. Marden; Vice-President, J. N. Lauder; Secretary and Treasurer, J. M. Ford; Executive Committee, J. W. Marden, J. N. Lauder, F. D. Adams, O. Stewart, D. C. Richardson, John Kent, C. J. Post, F. C. Moseley, G. H. Billings; Finance Committee, S. D. Nye, F. M. Curtis, Osgood Bradley, F. W. Getman, George Buntin, H. L. Leach, F. S. Sherburne, G. W. Peck, C. W. Sherburne. The report was accepted and adopted, and the officers nominated were declared elected.

The question of entertaining the master mechanics at their annual meeting in this city next June was referred to a committee of five to be appointed at the next meeting of the club. President Martin stated that he had arranged with the Boston Society of Civil Engineers for a joint meeting on Wednesday evening, March 24. He also stated the topics that will be discussed at the meeting, among them being various points in connection with the gauge of wheels.

After a little miscellaneous business, a vote of thanks to the Boston & Albany Co., for the use of rooms for the monthly meetings of the club, was passed unanimously. The following paper on the question of reducing the weight of cars in passenger service and the adjustment of springs to light weight cars was then read by Mr. Edward Cliff, of Oswego, N. Y.:

"It comes directly within the province of the spring maker to determine if it be possible to so adjust springs to a reduced weight of our present passenger car body as to insure easy riding upon fast express trains.

"It is first necessary to determine to what extent the service of the present style of spring equipment is dependent upon the weight of the car body, and whether the present advantages or disadvantages will be augmented by the reduction of weight. Hitherto the best combination is a full or half elliptic, built up with leaves or plates of steel, and used in connection with spiral coils technically termed "equalizers." In service the imperfections of the track are first communicated to the equalizers, in which the motion is wholly or in part absorbed, and the balance, if any, communicated to the elliptics. The equalizers, therefore, are first brought into service and their action is constant, so that it is important to improve them, so to transfer as little motion as possible to the elliptics.

"A single coil equalizer possesses the advantage of being a spring of large height and diameter, for upon these conditions depends the nature of the spring motion, becoming slow and easy as they are increased, or quick and sensitive as they are decreased. Taking the weight of the present style of car body to be 32,000 lbs., single coil equalizers may be so adjusted as to give almost perfect riding to the car when light, but by adding a load of 8,000 lbs., representing but 53 passengers, the total carrying weight is increased by one-fourth the weight of the body to which the springs were adjusted. This proportional increase of weight is so great that the springs become compressed, and their motion so reduced as to leave no proper play for the vibrations they are expected to absorb, and they will close completely at every severe shock, or when the brakes are suddenly applied. If, in order to avoid this, we adjust the springs to a loaded car, the coils must necessarily be made of such heavy bars that their action is too stiff for the car when light. Consequently, single coil equalizers cannot be made that will carry equally well a light or a loaded car, as the difference in weight between the two being at the lowest estimate one-fourth that of the body, is beyond the range of easy spring motion. If the car body is to be reduced to say 24,000 lbs., and we assume the same load of 8,000 lbs., the proportional weight to be carried is increased from one-fourth to one-third, and as one-fourth is too large to insure easy riding, the present disadvantages will be increased.

"With the present weight of car body, if, in order to increase the power, we use a two or three coil equalizer, another and a serious disadvantage presents itself; for being of the same height and consequently compressed to the same extent, the sensitive nature of the inner coils will control the action of the spring as a whole, and we lose thereby the soft easy motion of the large outside coil. The coils fit closely within each other, and are nearly of the same capacity, which in itself is a great objection, in addition to the unavoidable friction between the coils. An equalizer in very general use is composed of coils made from 1 $\frac{7}{16}$ in., $\frac{7}{8}$ in. and $\frac{11}{16}$ in. bars, and with capacities respectively of 4,000, 4,000 and 3,000 lbs. The aggregate of power in the inner coils is nearly double that of the outside coil, and hence its easy motion is almost entirely lost, and the sensitive nature of the two small coils is imparted to the equalizer.

"The question presents itself then, 'Is it possible to so contract an equalizer that it may be perfectly adjusted to a car when light, and then gradually receive a reinforcement of strength as the load is increased, and still preserve the easy nature of the largest coil?

"I believe it is not only possible to make such a combination for our present weight of car body so that it may ride equally well, light or loaded; but in such a combination it is also possible to make it carry equally well a reduced weight of body and still preserve in the spring the desired range of easy motion to meet the varying passenger weight. In order to preserve the advantages of the single coil, it is only necessary to adjust the outside coil of our equalizer to carry the car body light, and then shorten the inner coils, so that they may remain at rest until the outer coil requires a reinforcement of strength at two successive stages of its compression. In order that this additional power may meet the exigencies of the case, it becomes necessary to use varying sizes of bars, and coiled with varying diameters. This becomes possible, as each coil may be held independently of the other two by a combination of malleable iron plates, which also furnish the bearings for the graduation. At least ¼ in. space is thus obtained between the coils, and all friction is thereby eliminated. In the plain coil equalizer already referred to, the bars were $1\frac{1}{16}$ in., $\frac{7}{8}$ in. and $\frac{11}{16}$ in. for the coils, with capacities respectively of 4,000, 4,000 and 3,000 lbs., making an aggregate of 11,000 lbs. By using in a graduated equalizer $1\frac{1}{16}$ in., $\frac{7}{8}$ in. and $\frac{1}{2}$ in. bar coils, we obtain capacities of 7,000, 3,000 and 1,500 lbs., with an aggregate of 11,500 lbs. Through the use of such a combination of capacities and allowing $1\frac{1}{16}$ in. of independent motion to the outer coil and 1 in. between the second and third, we preserve in the equalizer the nature of the coil of largest diameter, for even when the combination is entirely compressed the power absorbed in the largest exceeds the combined power of the other two by 2,500 lbs.

"Should it become desirable to reduce the weight of the car body from its present standard, it will necessitate simply a reduced size of bar in the outside coil of this improved equalizer, in order to carry the lighter body, as we still preserve in the graduated power sufficient range to meet the requirements of the varying load. The principle of graduation is of the highest importance in any style of bearing spring, as it not only gives to both passenger and freight cars easier riding, but it actually prolongs the life of the car.

"Having attempted to show how it is possible to not only adjust an equalizer to the varying nature of its service in carrying weight, but also to any practical reduction in the weight of the car body, I would ask you to consider how far such a reduction will affect the present style of elliptics.

"An elliptic is expected to absorb motion transferred to it from the equalizer; so that in improving the latter we have less motion to transfer to the elliptic for absorption. All heavy vibrations must, however, be in part so communicated, and should be controlled in order to obtain easy riding. An elliptic which entirely absorbs vibrations at a low rate of speed and carries the car with a soft easy motion, will become rigid when the speed increases, and will impart to the car a continuous succession of quick, tremulous vibrations. The reason for this is apparent. Take, for example, an ordinary 36 in. 5 plate quadruplet elliptic, 12 in. over the bands and composed of leaves of steel of rectangular cross section 3 in. by $\frac{5}{16}$ in. Compress such a spring to its extreme limit and the ends of the separate plates will move through the following distances from the centre of the bands:

First or top plate	2 32 in.
Second plate	3-32 "
Third "	4-32 "
Fourth "	5-32 "

"The leaves of this spring have 2,274 sq. in. of bearing surface, and consequently the factor of friction in a plate elliptic spring is of very great moment. Its presence is not only the most desirable cause of the easy motion of the springs in service at a low rate of speed, but it also becomes the objectionable cause of their rigid state as the speed increases. This is a practical truth very easily demonstrated, by using single bar elliptics, which, of course, eliminate all friction. The easy riding motion becomes unpleasantly lively directly the speed increases, while the plate elliptics, under the same circumstances, become rigid. This difference is wholly due to friction, for in the case of plate elliptics as the speed increased the vibrations became so rapid that the frictional resistance prevented absorption, while in the single bar elliptic the quick vibrations accelerated the spring motion and the elliptic became too lively. Either extreme is, of course, objectionable, and it, therefore, becomes the object of the spring maker to govern or reduce the amount of friction to a desirable point. In order to do this, and still preserve the power of the rectangular bar, it is only necessary to reduce the bearing surfaces of the plates, by beveling them toward the edges and tapering the ends approaching in cross-section the oval form, but still preserving any bearing surface we may desire. We find this to be about two-thirds of the amount in rectangular plates, and, as another advantage resulting from beveling the plates to effect such an end, we have reduced the weight of the finished elliptic from 8 to 10 per cent., with, of course, an appreciable saving in cost. The use of beveled plates as above described, enables the present limit of thickness of the plate of rectangular cross-section to be increased from $\frac{1}{4}$ in. or $\frac{1}{2}$ in. to $\frac{1}{2}$ in., and consequently we obtain greater power for heavier car bodies without the addition of an extra plate. This is a very valuable consideration, as we can again reduce friction by using fewer plates and still preserve a good bearing surface between the plates by not being required to increase the bevel. It is possible to obtain the same power in such a 4 plate $\frac{13}{32}$ in. bar elliptic as is at present obtained in the New York Central standard 5 plate $\frac{1}{2}$ in. bar. The latter spring is 12 in. high at rest, while the improved elliptic would be but $11\frac{1}{2}$ in., thus starting the spring motion with the same ultimate power, nearer a straight line, which insures easier riding. Having entire control of the friction in this improved style of spring, it becomes merely a question of experiment to determine its desirable factor in the various styles of cars.

The foregoing principles of spring motion, as applied in the construction of the springs I have attempted to describe, will apply equally well, I believe, to any practical increase or decrease in weight it may become desirable to make in the car body."

The following letter from Mr. H. Stanley Goodwin, Superintendent of the Lehigh Valley Railroad, was then read:

"I am in favor of reducing the weight of cars in passenger service provided it can be done without sacrifice of strength or any other desirable feature. I do not see, however, how this can be done. I consider it possible to adjust the springs to light-weight cars so as to give easy riding cars on a fast express train. We succeed in doing this so as to fill the requirements entirely, and experience no difficulty in so doing. The weight of our standard Eastlake car with fifteen windows on each side is as follows:

Body	27,888 lbs.
Trucks	17,248 lbs.
Total complete	45,136 lbs.

"We consider the form and proportions correct and desirable, and in consequence we would recommend these weights for body and trucks."

In the discussion which ensued, Mr. F. D. Adams advocated light cars. Mr. Geo. Richards, J. W. Marden, J. T. Chamberlin, John Coghlan and A. M. Waitt also spoke on the subject of light-weight cars and the methods of trussing.

The Medical Department of the Elevated.

The doctor's office of the Manhattan Elevated road is situated in a room near the main offices at 73 Broadway. One doctor attends to the Eastern and another to the Western Division. The New York *Herald* publishes the following interview with Dr. Field, one of the physicians:

"All accidents, whether serious or not, are reported to us by telegraph, whether of passengers or our own employés. Our operators at the Bleecker street station communicate at once with Police Headquarters from the west side, and so do the Houston street men on the east side in case of serious accident. Further than this, as we have about 4,000 men in our employ, policemen are provided with cards which they can give to any one requiring our assistance, and thus prevent imposition. This card authorizes a policeman to use our telegraph system for the purpose of either obtaining an ambulance or for notifying us for immediate attendance. Small injuries are, however, the most numerous. We pay for our men if taken to a hospital, or if taken home we go and visit them and keep a general supervision over them, so that they are well cared for. Slighter injuries are attended to right here, of which we have about 30 cases a week. The closets of the room are filled with all sorts of medicaments, salves, lint, bandages, etc. A large portable medical satchel, filled with the necessary instruments and bandages, stands ready for a case of emergency, and is carried by the surgeons on duty.

"Out of the 4,000 employés there were at least 500 repair men always on duty. It is these men who get constantly injured, principally in the eyes; so do also the couplers of cars. Trackmen, who must listen with their ears close to the rails whether they hear any noise—the flag division especially—in foggy weather are apt to slip; and these accidents from slipping are more numerous, especially in winter time, than all other mishaps. But the most fruitful source of accidents is the thoughtlessness and ire of passengers attacking our train-men—"guards" they are called. The gates must be shut when ordered. Now, only a day or two ago we had one of our guards here who may probably lose his eye. His condition was very serious. An irate passenger, because the gate was shut, struck him across the eye with a heavy cane, and the poor fellow may lose his sight forever. Of course, neither he nor do we know who the assailant is, as the train was just moving off when the guard was struck. But these assaults occur almost daily, and they are quite numerous on the midnight trains. It is but right, therefore, that the company should provide for the medical care of its employés, and we are here to attend to this business."

Among other functions discharged by these surgeons is the examination of all employés for color blindness, sight and hearing. Those no longer considered in sound condition are given other and less important positions where these physical qualities are of no such great consequence. As no expense whatever is attached to the medical treatment of a single employé of the elevated road, there is some redeeming feature even in that corporation which possesses the monopoly of New York's rapid transit system.

Contributions.

The Field for Employment of Engineers in America.

PHILADELPHIA, February, 1886.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Before leaving this land let me, through your paper, leave a few words to the engineering public concerning the field of engineering work and the demand for engineers here, a thing most impressed upon my mind during my journey through different parts of this country.

For some past years it has become a general complaint among engineers that their field of work is yearly becoming smaller and smaller. It seemed curious to me that a country not much more than a century old, with its immense resources, could so soon begin to fail to furnish work for its people. In traveling, I was careful to observe the real condition of affairs in this field. But the more I have seen the more I saw the vastness of its field, yet unsought, unclaimed.

It is evident that the demand for engineers to-day is not of such a suddenly occurring nature as it was years ago, for the era for new railway enterprises is past; but the work on those vast railway systems already existing—the work of extension and improvement from time to time—is immense; and there indeed lies a work more difficult and important than the primary construction, when in the rush of a moment many considerations of expenses were forgotten.

The weight of responsibility resting on engineers of standing, to whom mostly are left the design and all the details of construction, is really great, while the president, superintendent or chief engineer—whoever it may be—of any such a corporation, has to act more in the capacity of a business man; and it must be confessed, too, that those who are pioneers either in the organization of the corporation or in the construction of works, have certain claims to these positions, no matter what their individual merits may be otherwise. But it is always in the mode of design, its details, the skill with which the construction is carried on, that the safety of the structure and the expense of the work and material entirely depend.

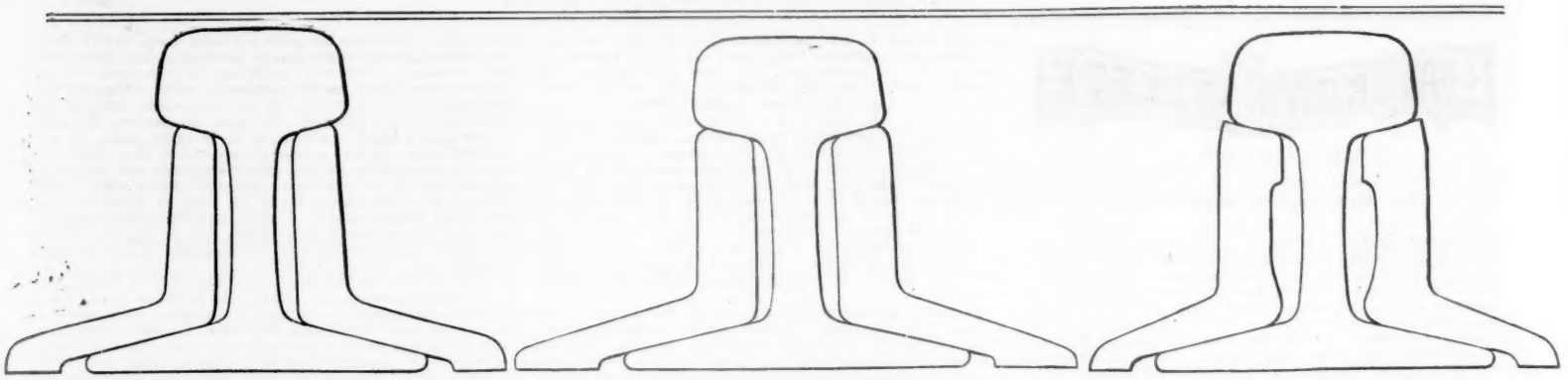
The successes and failures in engineering works of note, which have either made famous or utterly ruined the names of their engineers, are often to be traced to their subordinate workers. The success of James Eads, the failure of Thomas Bouch, are something to illustrate this point.

Not in places like New York and Philadelphia, where everything is exposed to the eyes of critics flocking from all parts of the world, can you find much that is faulty in anything; but go to the South and the West and then you shall find thousands, millions of dollars just thrown away, as it were. Go along the thousands of miles of railway in the Western mining regions, look in the cities and towns, examine their structures and ask what they cost to build, and you will then see that one cannot really build a railway, its bridges and viaducts, merely with level and transit.

Only a few days ago one of my friends was invited to a bid on a bridge on a Southern railroad. The plan on which the bid was to be made, he said, was a most ridiculous thing; the details were awful, made by an engineer (heaven save the name!) of that road. To use his words, "One must go to a curiosity shop to obtain things of such antiquity," and in such a shape costing twice as much as one of modern and far superior design.

This is but one small case out of thousands where an immense amount of money is just thrown away by those in whose hands it is intrusted, an utter injustice to those whose capital is interested in the work.

There remains one thing among many to be done more important than the rest in carrying out an engineering work, and it is for those in charge of it to open all positions to be filled free to competition, and thus do away with all sort of favoritism, for the good that will surely follow.



OLD PATTERN ANGLE BARS.
28 lbs. per pair.

NEW PATTERN 1884.
36 lbs per pair.

NEW PATTERN 1885.

PENNSYLVANIA AND PITTSBURGH, CINCINNATI & ST. LOUIS ANGLE-BAR JOINTS.
(Half size. All 24 in. long)

Then will there be no lack of work for those who are really deserving, so far as I can see in the present condition of the country, and even for many years to come. As for mere surveyors, many of them must find that their time is past. W. H.

[The writer of the above is an eminent European engineer, whose opinions are greatly respected.—EDITOR RAILROAD GAZETTE.]

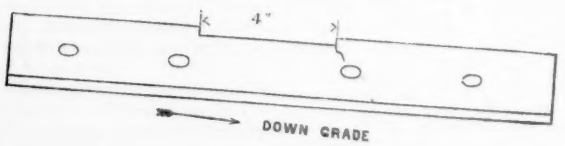
"Why do Angle-Bars Break?"

TO THE EDITOR OF THE RAILROAD GAZETTE:

Several months since an able article of the above caption was written by Mr. M. J. Becker, Chief Engineer of the Pittsburgh, Cincinnati & St. Louis Railway, and read before the Western Society of Engineers at Pittsburgh. In this paper it was stated that the bars broke on top, and one of the assumed causes, in the case of the suspended joint, was the load pressing only on one joint tie, while the other joint tie was not loaded, causing a rocking motion at the joint.

The investigation resulted in a recommendation that the angle-bar be made heavier, and their weight was increased from 14 to 18 lbs. each, with also a slight change in the cross section.

The following statement of facts as existing on one of the principal lines of railway may be of interest to those engaged in maintenance of way, and in the scientific construction of rail joints. The railway in question is one of the best; it is single track and laid with 60-lb. steel rail of three brands, **X**, **Y** and **Z**, well tied with 16 to 18 ties to each 30-ft. rail, well gravel-ballasted, and perfectly drained. Particular care is given to surfacing, lining, and other repairs.



In surfacing, different plans were adopted; on some sections every tie, and on others only the joint ties were pick tamped, and again, on some the shovel alone was used.

On bridge floors the ties are 7 × 8 in., of good white oak, spaced 8 in. between ties. The bars were of a fair quality, and on physical tests show ultimate tensional strength from 45,000 to 55,000 lbs. per square inch.

Angle-bars of the new and heavier pattern, as recommended, were used in replacing broken ones of the old pattern.

Yet, with all these precautions, the bars still broke.

The line was divided into subdivisions, the east end, 73 miles, with an annual gross tonnage of about 6,000,000, and the west end, 101 miles, with a tonnage of 4 000,000. Heavy "Class I" (consolidation) freight engines are used on the former.

The subjoined, Table I., gives the number of bars on each subdivision, previously broken and replaced, also the number of bars now broken in track.

TABLE I.,
Giving Number of Bars of Old and New Heavier Pattern Broken and Replaced on each Subdivision.

SUBDIVISION.	Bars previously broken and replaced.			Bars in track now broken.		
	Old pattern	New pattern	Total.	Old pattern	New pattern	Total.
East end, 73 miles	9,012	83	9,095	8,289	1,197	9,486
West end, 101 miles	5,660	.....	5.660	11.022	18	11,040
Total	14,672	83	14,755	19,311	1,215	20.526

	Total bars broken since steel was laid.			Per mile.	Per cent. total bars.
	Old pattern	New pattern	Total.		
East End, 73 miles	17,301	1,280	18,581	254	36.1
West End, 101 miles	16,682	18	16,700	165	23.4
Total	33,983	1,298	35,281	203	28.8

Table II. shows the total number of bars which have been broken on each steel.

TABLE II.,
Showing Total Number of Bars Broken on each Brand of Steel.

SUBDIVISION.	X			Y		
	Miles.	Bars.	Per mile.	Miles.	Bars.	Per mile.
East end, 73 miles	55 8	16,047	288	7.1	1,109	156
West end, 101 miles	34 8	9,010	259	48.7	6,538	134
Total	90.6	25,057	276	55.8	7,647	137

	Z			Total.		
	Miles.	Bars.	Per mile.	Miles.	Bars.	Per mile.
East end. 73 miles	10.1	1,425	141	73.0	18,581	254
West end, 101 miles	17.5	1,152	66	101.0	16,700	165
Totals	27.6	2,577	93	174.0	35,281	203

As to the influence of grade, it was found that on the **X** and **Y** steel more bars were broken on the light than on heavy grades, while the reverse is true of the bars of **Z** steel.

Up to this point our investigations *tend* to show that the breakages are not due,

1st. To the volume of traffic.

2d. To the use of consolidation engines.

3d. To the quality of iron in the bar.

4th. To the grades, deficient ballast, bad ties and manner of surfacing track, etc.

By reference to Table II., and noting the difference in the number of bars broken on **Z** as compared with **X** steel (276 on **X** against 93 on **Z**), we may look as a cause to some unknown element in the rail. This unknown element we will leave to others to determine. It is a noticeable fact, however, that our steel rails are softer than they were several years ago, due largely in their manufacture to the decrease in phosphorus, as required in the formula of Dr. Dudley, of Altoona.

The following Tables III. and IV., are in substantiation of the fact that the older steel is not as destructive to bars as the steel of recent manufacture:

TABLE III.,
Showing the Comparative Number of Breakages on the Older and Harder Steels and that more Recently Laid.

Date steel was laid.	X			Y		
	Miles steel.	Bars broken	Broken per mile.	Miles steel.	Bars broken	Broken per mile.
1878	10.0	1,414	141	.....	.....	.....
1879	23.2	5,241	226	.....	.....	.....
1880	22 6	9,483	420	7.1	1,109	156
Totals	55.8	16,047	288	7.1	1,109	156

	Z			Total.		
	Miles steel.	Bars broken	Broken per mile.	Miles steel.	Bars broken	Broken per mile.
1878	8 1	1,224	151	18.1	2,638	146
1879	2.0	231	110	25.2	5,474	215
1880	.....	.....	.....	29.7	10.517	355
Totals	10.1	1,425	141	73.0	18,581	253

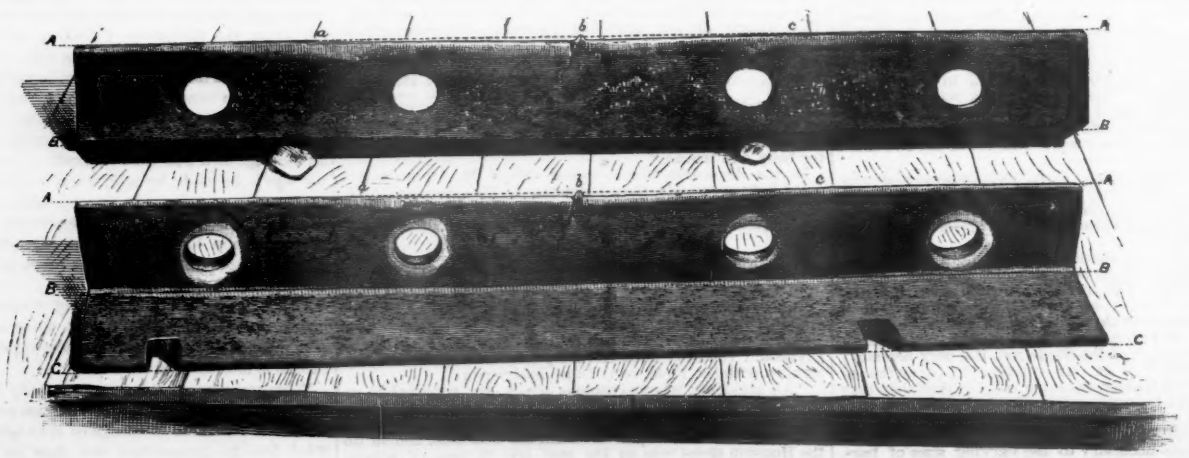
TABLE IV.

X Steel.

Date laid.	Broken per mile.	Years in use.	Average No. broken per year.
1878	141	7	20
1879	226	6	38
1880	420	5	84
1884	373	1	373

The figures in the last column of Table IV. were obtained by dividing the number of broken bars per mile by the number of years the steel has been in service.

Of two lots of **X** steel laid in 1884, 53 per cent. of tee bars were broken within twelve months. These bars were new and of the heavy pattern. Of the total number of new



CRACKS IN ANGLE-BAR.—FROM A PHOTOGRAPH.

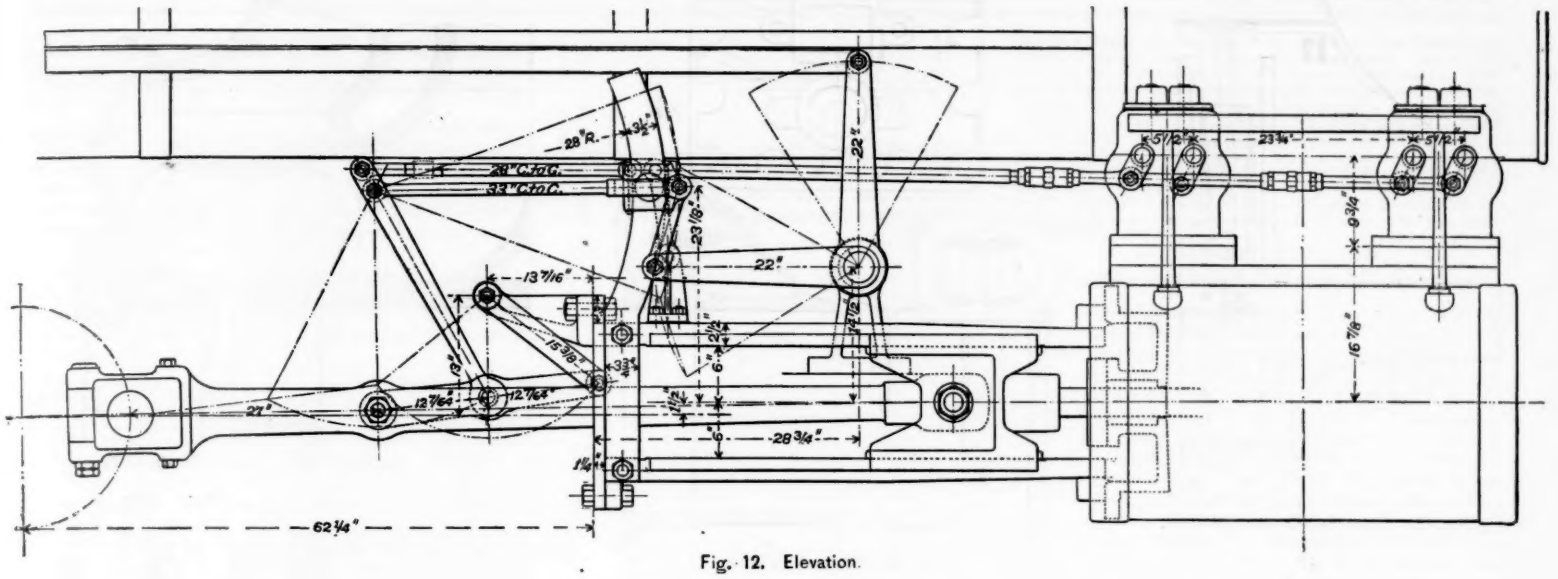


Fig. 12. Elevation.

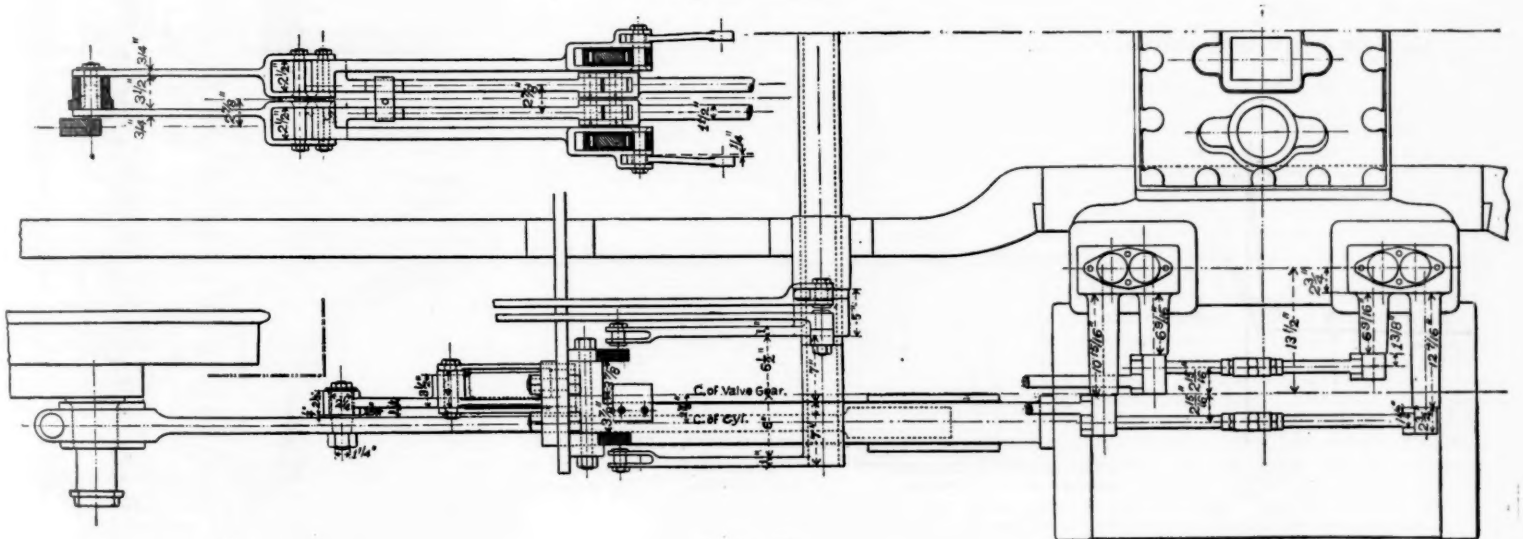


Fig. 13. Plan.

STRONG'S LOCOMOTIVE VALVE GEAR.

pattern bars used to replace old bars, 10 per cent. were broken after a year's service; and it is conclusive that the new bars are little, if any, better than those of the old pattern. Sixty-six broken ones were found on good bridge floors.

The heavy bars used were of the 1884 pattern. None of the 1885 pattern with shoulder or rib were tested.

With a view to remedying the breaking of the bars the following experimental suggestion was offered, *i. e.*, planing or cutting out the upper edge of the angle-bar, so as to prevent the lower edge or surface of the rail head, for a distance of two or three inches, coming in contact with the bar.

This, on the theory that the bars are cracked by repeated blows, and to prevent the impact of the lower edge of the rail-head, it was necessary only to make the top edge of the bar lower than the point of extreme deflection of the end of rail. In a distance of 2 in. this deflection would be infinitely small. In usage the bars are worn bright on the top edge on each side of the centre. In a short time a slight ridge is found across the top of the bar, of about the width of the opening between the rail ends. This ridge becomes larger, until in time a slight crack appears at its edges, as shown in the accompanying engraving.

To test this theory, we planed or cut out about 1/16 in. 4 in. long in the centre of the top edge of 50 angle-bars, and placed them on the steel laid in 1884, and on which 63 per cent. of the new pattern angle-bars broke inside of one year's service. (See Table IV.) These bars were put on September and October, 1885, and remained unbroken until January, when during the severe cold weather, on examination, over 60 per cent. were found cracked.

The cracks were, with one or two exceptions, on the down grade side of the joint, and at the end of the planed-out section. Some of the cracks run into the bolt holes, as shown on the small cut herewith.

INDIANAPOLIS, Feb. 11, 1886. M. W. MANSFIELD.

The Strong Valve Gear.

The accompanying illustrations represent a form of valve gear patented by Mr. George S. Strong, of Philadelphia, and show the gear as applied to locomotives, for which use it is specially designed. A general view and description of a locomotive fitted with Mr. Strong's valve gear has already appeared in these columns.*

The valve gear, as will be seen from the illustrations, is actuated wholly from the connecting-rod, no eccentrics being used. It differs mainly from other valve gears of this class in the manner in which the radius arm for reversing and varying the cut-off is secured. It will be noticed that one end of this arm butts against a sliding block moving on a fixed bar struck to the proper radius. The thrust is therefore mainly taken by the fixed bar, which is not so liable to spring as a lever on a weigh shaft.

The gear has no working sliding surfaces, but works in all cases on true centres.

As illustrated, the gear works valves of peculiar design, through the medium of rock shafts, but this arrangement of valves is not an essential part of the valve gear. The latter can be used to give motion to ordinary slide valves if desired. Mr. Strong, however, considers that the rock shafts improve the motion of the valve, and that the peculiar gridiron form of the valve diminishes wire-drawing, and being practically in equilibrum, is easily moved.

The Strong valve gear is specially designed to give practical uniformity of boiler and admission pressures, and also to reduce back pressure to the lowest possible point. Not content with diminishing the losses from wire-drawing and back pressures, Mr. Strong has also sought to make the gear work easily, and be capable of being manufactured and kept in repair at a low cost.

The following description of Mr. Strong's valves and valve gear is taken from a paper read by Mr. Otto Grüninger, of New York, at the last annual convention of the Master Mechanics' Association:

"To lessen wire-drawing we must have large port areas and a rapid opening and closing of the valves; and to reduce back pressure, especially at the early points of cut-off, we must also separate the function of exhausting from that which governs the admission of steam.

"To obtain large port areas Mr. Strong applies gridiron slides, and in order to carry expansion to the greatest extent without involving an excessive compression, he makes use of independently worked valves for admission and for exhaust. There are two valves to each cylinder, and all of them are worked independently.

"The port area which Mr. Strong obtains in an engine with 19×24 cylinders, is *fifty* square inches, and this feat, together with a total clearance for each cylinder end of only 4 per cent. of the cylinder volume, was made possible by placing the long gridiron valves vertically and at right angles to the axis of the cylinder, and bringing them close up to the cylinder walls. The arrangement resembles somewhat the disposition of the valves in a Corliss engine; but here the slides have a rectilinear up and down movement, and the two valves of each cylinder end are placed on the same side of the cylinder and close to each other.

"Their movement is the result of the combined action of two distinct mechanisms. The duty of the first one is to receive the primary impulse of motion from the running gear of the engine, and impart it to the second mechanism, a system of levers or rockers, in a properly modified form.

"The first mechanism is nothing else but an adaptation of the Brown gear. Instead of using Mr. Brown's compounded radius bars, Mr. Strong substituted one single radius bar, the fulcrum of which is located on a block which, by sliding on a fixed quadrant, can be brought into the different positions of fore and back gear. This block, properly called a thrust-block, takes up the thrust of the valve rod, and if its position on the quadrant is to be changed, only the frictional resistance of the block, and whatever tangential component of the thrust that exists, have to be overcome. This gear admits of very easy handling. An engine with 160 lbs. of steam can be reversed with full steam on with one hand.

"Where the general disposition of the engine will admit of a single radius bar of sufficient length—a condition not always readily fulfilled, when the valve is to be worked *directly* from the pendulum lever—this device may be employed; while Brown's compounded radius bars always give complete control over the curvature of the path *X X*. In Mr. Strong's case, where there exists a system of rockers to modify the motion before it reaches the valves, any shortcomings in the distribution of steam that may result from too short a radius bar, can be corrected by proper dimensions of the rockers.

"The motion, when it reaches the rockers, is similar to that of an ordinary slide valve. Fig. 9 will illustrate how essentially they modify it. *E* is the valve seat, and *D* the valve. The motion from the Brown gear is communicated to a lever or rocker *O A*, which imparts it to a second lever *O B* on the inside of the steam space. A link *B C* connects the lever *O B* with the valve. The figure shows the moment where the crank-pin is on its centre; the valve has opened the port by the amount of lead, and the position of *A* corresponds to the position *n* of a point of the outside valve rod; *n m* is the distance the valve rod has to travel in mid-gear, and with a direct connection to an ordinary slide valve, *n m* would be equal to the sum of lap and lead; *p q* represents the total traverse of the valve rod when in full gear. As *n* continues its motion in the direction of *n p*, it will be seen from the position of *O B* and *B C* that the valve is made to open rapidly, as it also will close rapidly when returning to its present position.

"But, in returning, the more the point *B* approaches the point *B'*—this latter point being defined by the condition that a straight line *B' O C* be equal to the length *B C*—the slower will be the motion of the valve, and for a perceptible distance to either side of *B'* the valve will appear to be almost at a stand-still.

"This peculiarity has been utilized by Mr. Strong in the motion of the four valves. Each one has its special set of rockers, and they are so arranged that while one of the admission slides is opening rapidly, the other one, having covered its lap, is almost at rest. The motion is also so timed that the valve does not commence to open again until it has compression under it, which balances it to a great extent, and the valve will therefore move with very little friction. While the outside valve rod has a total travel of 4 in., the gridiron slides travel only 1 1/16 in., and at an early cut-off this is reduced by about one-half.

"The movements of the exhaust valves are correspondingly timed so as to open quickly within the last inch of piston travel, when the pressure in the cylinder is already reduced. The frictional losses, therefore, will also here be very small.

"The motion of the steam and exhaust slides being entirely independent, the exhaust slides work full stroke at all points of cut-off, causing free exhaust, late closure and little compression—just enough to give a sufficient cushion for perfect smoothness of running at any speed. As the exhaust valves do not open until within the last inch of piston travel,

* See *Railroad Gazette*, Feb. 5, 1886.

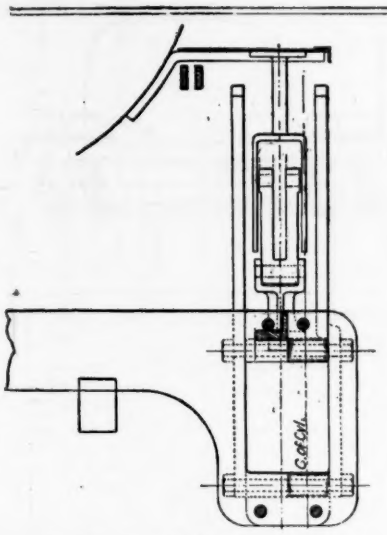


Fig. 15. Cross Section through Yoke.

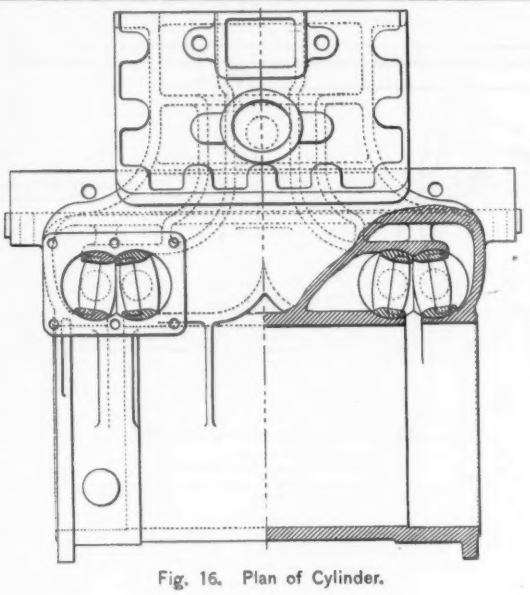


Fig. 16. Plan of Cylinder.

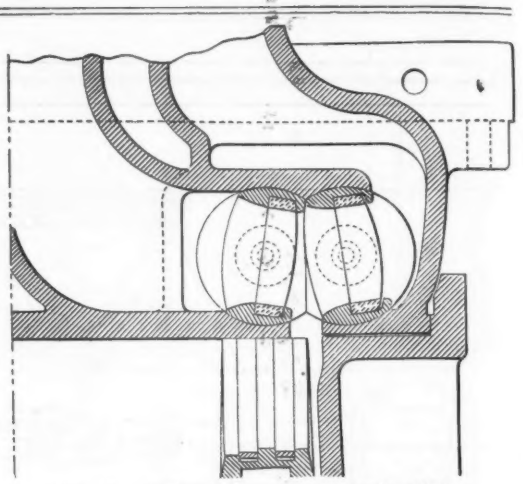


Fig. 17. Sectional Plan, showing Details of Valves.

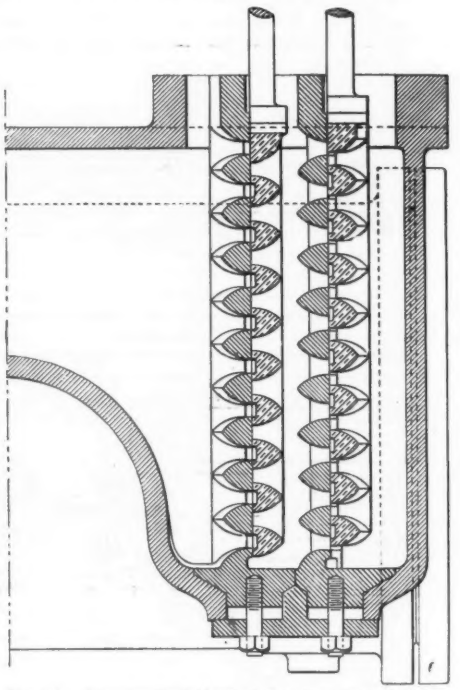


Fig. 18. Longitudinal Vertical Section through Valves.

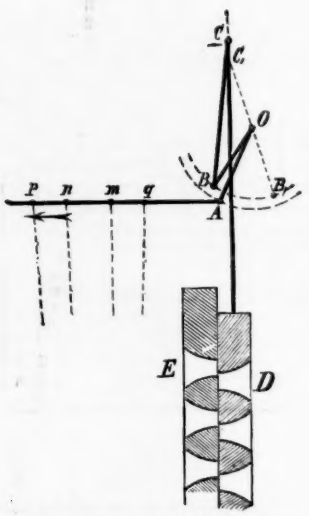


Fig. 9. Diagram of Valve Rockers.

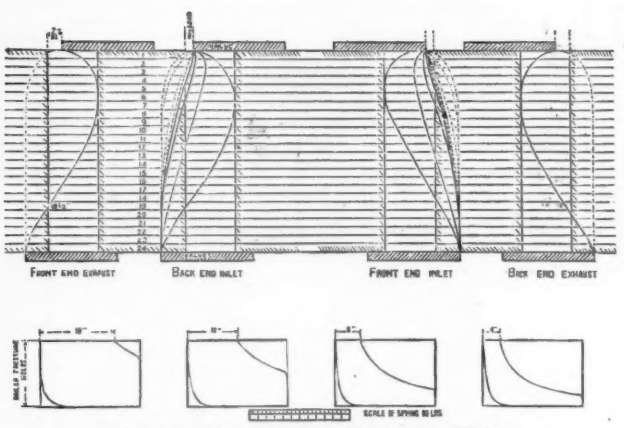


Fig. 11. Diagram showing Movements of Valves.

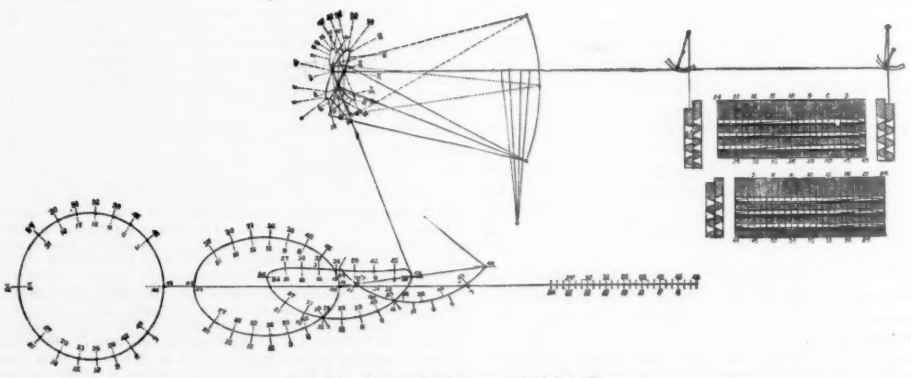


Fig. 10. General Diagram of Valve Gear.

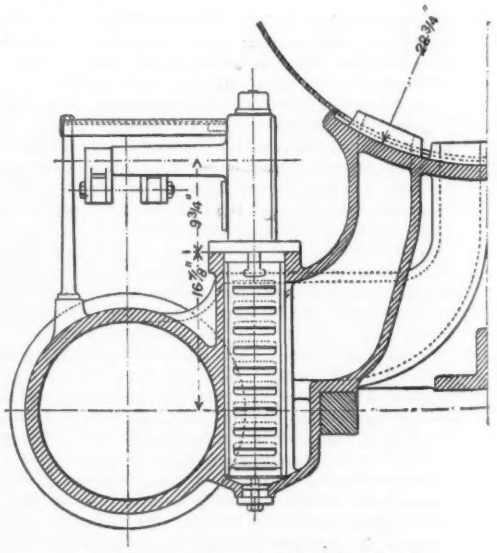


Fig. 14. Cross Section through Cylinder.

STRONG'S LOCOMOTIVE VALVE GEAR.

the steam is practically expanded to the end of stroke, and on account of the independence of the valves, steam may be admitted from 3 to 20 inches, giving a large ratio of expansion, and a very powerful engine for starting.

"The construction of the boiler in Mr. Strong's engine is such as not to require a strong blast; a large nozzle is therefore used which reduces back pressure to the lowest limit. With the large port areas, together with the rapid action of the valves, admission pressure is carried within one or two pounds of boiler pressure, and it is carried out to the point of cut-off without anything like the loss experienced with an ordinary valve.

"The peculiar intermittent motion of the girdiron slides—similar in effect to the action of cams and tappets—takes the wear from them, and it affords the best balance possible without any balancing device. I may mention that valves constructed on this principle, but operated by cams, have been at work for twenty years night and day, and they are as tight now as when started.

"There is no steam chest on the cylinders. The valves are interposed in the passages, and the passages are very large, affording a free steam supply and a free exhaust. Concerning weight, the cylinders on a 19×24 engine are 800 lbs. lighter than those of the regular type with chest and ordinary valves. And with regard to manufacture, the valve seats are introduced entirely by boring. Planing and slotting are done away with, except the planing for the frames, saddles and truck centres. The cost of cylinders and valve gear, with equal facilities, can be reduced below the cost of the ordinary link motion and ordinary cylinders, and the former will wear far better than the latter.

"Uniformity of detail and standard sizes are aimed at in all branches of practical railroad operation. To think of general standard sizes with such a complicated mechanism as we have in our engines, seems almost to border on the ridiculous, and yet with Mr. Strong's gear, two standard sizes would

Particulars of Indicator Cards.

Strong's Valve Gear, Engine No. 383, Lehigh Valley Railroad.

Diagram fig No.	1 A	1 B	2	3	4	5	6	7	8
Pressure, boiler, lbs. per sq. in.	155	155	145	150	145	..	..	..	153
" Initial, " " "	135	146	136	136	136	126	115	98	131
" Mean " " "	91.2	78	64.2	53	53.3	49.5	..	..	..
" Minimum back, lbs. per sq. in.	1	3	4	7	7	6	..	..	6
Throttle opening, per cent.	..	.....	57	57	57	57	..	..	57
Cut off, per cent.	...	.....	30	...	...	...	70	..	30
Speed revolutions per minute.	86	112	115	200	175	175	..	80	184
Speed, miles per hour.	17	23	23	41	36	35	..	16	37
Indicated horse-power.	539	600	508	725	633	595	..	..	..
Consumption, lbs. water per I. H. P. per hour, calculated from indicator cards.	..	21	20.5	22	21	22.5	..	..	..
Load, No of cars.	..	9	9	8	8	8	..	..	9
" weight of cars, lbs.	..	463,000	463,000	410,000	..	..	..	..	..
" " of engine, tender and cars.	..	633,000	633,000	580,000	..	..	..	..	..
Grade, ft. per mile.	..	9	9	34	34	34	..	..	..

answer for all classes of locomotives, one for four, and another one for six, eight and ten couplers. Everything might be reduced to a few standard parts. Drop-forgings to standard dies, and finishing limited to working faces, would most essentially simplify manufacture and cost."

The detailed illustrations of the valves, valve-gear and cylinders, figs. 12 to 18 inclusive, show the latest modifications of the valve gear, including many important improvements in detail that have been introduced since the date of Mr. Gruninger's paper. As the principles on which the gear is designed remain unchanged, Mr. Gruninger's explanation of the working of the gear still holds good.

The indicator diagrams, figs. 1 to 8, were taken from locomotive No. 383, now running on the Lehigh Valley Railroad. The diagrams show the small amount of back pressure and the late compression very clearly. The leading dimensions of the engine are as follows:

Cylinders, diameter and stroke	19 in. by 24 in.
Drivers, diameter on tread	68 in.
Tractive force per lb average pressure in cylinders	127.4 lbs.
Weight in running order	104,000 lbs
Weight of tender, with coal and water	73,000 lbs.

It will be observed that none of the diagrams are taken at a very high speed. This is due to the fact that all the diagrams were taken on up grades. The diagrams shown in figs. 7 and 8 were taken while the engine was running without a train to the round-house, and show the action of the cut-off valves at a slow speed. The earlier cut-off in fig. 7 was taken in the same notch as the majority of the diagrams taken with a train, the suppression occurring at about 30 per cent. of the stroke. The high back pressure in fig. 8 is abnormal, and is not likely to occur in actual practice.

Railroad Management as a Profession.

For some time past the students of Harvard University have been listening to a course of lectures on the various professions, by eminent representatives of each. The fifth lecture in the course was on Railroad Management as a Profession, and was delivered by Mr. Charles Francis Adams, Jr., on the evening of March 16. Mr. Adams' remarks (omitting those of a prefatory and general nature) are reported in the Boston *Herald* as follows:

Corporated bodies have sprung up, an army of themselves, of which the one at the head is a captain of modern industry, controlling forces and accomplishing results which a single individual would never dream of. It is this which constitutes the difference between our times and those of our fathers. It is an organization which a man enters at the bottom and climbs to the top, as it were, on the rounds of the ladder. It is of these organizations which I am to speak to-night.

Of the corporations of the present day none has assumed so large dimensions and has such large functions as the railroad. I can easily remember when the first railroads were organized in this state. An apothecary was president of the Old Colony Railroad, which carried 250 passengers a week, considered something wonderful 40 years ago. In the modern railroad, there are five departments.

First is the Financial Department, which is the sinew of the whole body, its ways and means; second, the Construction Department, of which the head is the chief engineer, who lays out the road; thirdly comes the Operating Department, with the Superintendent at the head; fourth comes the Commercial Department, looked after by the General Traffic Manager; and then, fifth, comes the Legal Department. The Counsel for the company looks after all legal papers, suits, etc., and has a vast amount of business to attend to. The duties of these departments are as varied as those of the United States Government, and the heads constitute a sort of cabinet, and the pivot wheel around which the whole machinery moves is the president.

In the beginning of the building of railways, $1,000,000 was deemed a large capital for a railroad. The capital of the Union Pacific is represented by $270,000,000 of securities of the 40 or 50 roads which are combined in this general system. Its income is $25,000,000 a year and in profitable times reaches $100,000 a day. It employs 12,000 men and has a month'y pay-roll of $800,000; 12,000 cars are run by 550 locomotives; 25,000 tons of steel rails are used in replacing worn-out rails and 2,000,000 ties have to be used in keeping the road-bed in condition.

If you compare this with the United States government, the affairs of the latter, during the first 50 years of its existence, were trifling. Yet this is only one system, and there are five more by the side of which, for example, the Pennsylvania, the Union Pacific is insignificant. If this is the growth of 40 years, what will be that of 60 or 80 years. I confess that I am unable to forecast it. This great principle of consolidation and aggregation, like the principles of gravitation, has as yet but begun to develop its results. And I feel confident that the future managers of the railroad will be men of much greater capacity and ability than those of the present day.

Now to come down to the practical part of the profession. Suppose a college graduate says that he wishes to take up railroading as his profession. He comes to me and asks what are the chances of success. There is an old saying of Napoleon that "Every private carries in his knapsack a marshal's bâton." So here. It is often said that there is no royal road to eminence. I cannot agree with this. There is no easy way to thorough and proficient knowledge, but there is a way in which some may travel and acquire eminence. If we suppose a young man is deciding between the law and railroading, what should I say to him concerning his chances, supposing industry, devotion, temperance the same. I am not prepared to say that he would succeed in one quicker than in the other. But if you enter any of the learned professions, it will require at least three years of study before you will be prepared for practice, and two years longer before a living practice will be obtained. In all, five years will be consumed, during which time you will not earn a cent. Now, supposing a person, relying on his individuality, enters a railroad office. He is in the condition of the start of a cadet at West Point or Annapolis. His living is provided from the beginning. Perhaps he may not get more than $50 a month at first, but by the end of five years he will be as far advanced as the lawyer or physician. It will be a hard struggle for promotion in the lowest ranks.

Suppose the Finance Department be gone into. You will have to begin at the bottom, and the outlook before you is not particularly inviting. Most likely you will assume a position in the counting room, sit on a tall stool with a ledger before you and work from 9 a. m. to 6 p. m. over many bills, accounts, etc. There is nothing interesting in the work, and it soon will become monotonous or disagreeable. The Construction Departments is more attractive. This is connected

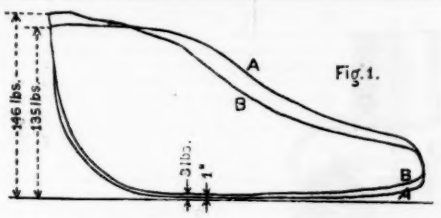


Fig. 1.

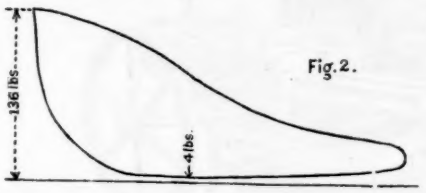


Fig. 2.

Fig. 3

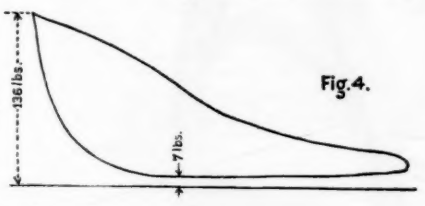


Fig. 4.

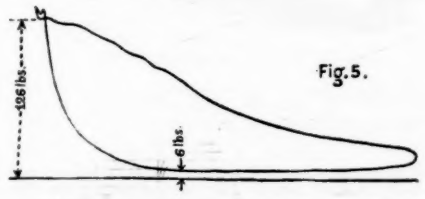


Fig. 5.

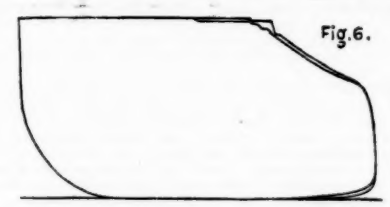


Fig. 6.

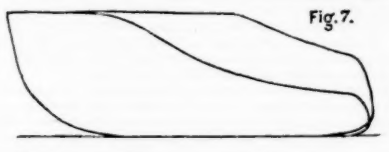


Fig. 7.

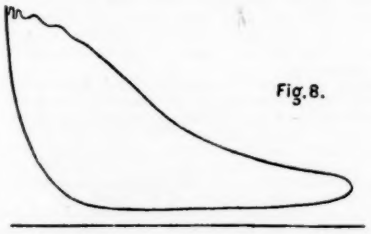


Fig. 8.

Indicator Diagrams, Strong's Valve Gear, Engine No. 383, Lehigh Valley Railroad.

with outdoor life and the camp. From this, having shown what you are good for, you would naturally work into the Operating Department. This offers as inviting an outlook, in my opinion, as the Construction Department. Some young men don't seem to think so. The father of a young gentleman came to me and asked me if there was an opening on railroading for his son. Certainly, I said, I will get him a position as brakeman on this road. The look on the father's face was a study. The offer was not taken, and yet I should think that turning a brake would be more enjoyable than driving a quill. There is no essential difference between these and the Legal Department. In all it is a time of times and perseverance.

The advantages of an organization are marked. You go forward by seniority, as it were, step by step. But, on the other hand, the lawyer or physician has the advantage of having greater freedom. Still, after all, you look forward to great prizes, and I don't know what profession offers greater prizes than the profession of railroading. Every day, in this era of small things, there is something very captivating in the management of a great railroad. Round my desk are wheels moving day by day. At this minute, far out on the plains, at Salt Lake, at Colorado, those wheels whose governing impulse is centred in the Equitable Building, Boston, are moving, moving, moving. What pleasure can be greater than that of knowing that you control them all? It may be safely said that the railroad profession includes all professions. You would think that theology had little to do with railroads. Still, we approach this. The questions of social science constantly arising have a very close bearing on theology. To-day questions involving labor are daily considered by me. Then we have a Hospital Department, managed by the best physicians. Engineering is approached most closely of all. Not a day passes without communication by me from the Chief Engineer. There is also a Chemical Department. As for the lawyer, his employment by the railroad is incessant. The the finances present trying questions, which would have confounded the Treasurer of the United States a few years ago. All this work revolves about the head of the railroad corporation. If compared with the other professions, there can be but little doubt that, to a man who has risen to the top, no profession brings a broader, more liberalizing life than that of railroad management.

The speaker closed his address with some generalities and good advice to young men about to enter any profession whatever.

The Proposed Standard Bridge Specifications.

The proposed meeting of bridge manufacturers, iron and steel manufacturers, and of railroad and bridge engineers, was held in Pittsburgh, as announced, at the Monongahela House, Tuesday, March 16. Mr. J. L. Randolph, Consulting Engineer of the Baltimore & Ohio Railroad, was appointed Chairman of the meeting, and Mr. Collins, Secretary. About 30 manufacturers and engineers were present. Among others Mr. Wm. Sellers, Mr. Slade of Trenton, Mr. Percival Roberts (Pencoyd Iron Works), Mr. Max F. Becker (Pittsburgh, Cincinnati & St. Louis Railway), Mr. S. Bouscaren, Mr. Thos. Rodd (Pennsylvania Co.), Mr. C. L. Strobell (Keystone Bridge Co.), Mr. Dagron, Mr. Ferris, Mr. Griffin (Keystone Bridge Co.), Mr. G. Lindenthal, Mr. Irwin (Cleveland, Columbus, Cincinnati & Indianapolis) and others.

Letters were read from Messrs. Jos. M. Wilson and D. J. Whittemore.

The specifications were considered seriatim in sections, and we give them below as amended so far as action had been had, giving the original reading in parentheses. The amendments, in almost every case by very close voting, and after much discussion, were adopted. Sections 4, 5, 6, 12, 16, 17, 18, 19, 20 and 22 were referred to a committee for special consideration, and at this writing the committee had not reported. It consisted of Mr. Wm. Sellers, Chairman, and Messrs. Bouscaren, Becker, Dagron, Ferris, Slade and Milliken.

On the question of double refined iron there was general agreement against recommending that it should be stipulated as such in the specifiations. On the quality and tests of steel there was much divergence of views, as also on the proper manner of testing and inspecting iron and steel.

It is expected that the meeting, if productive of no other good, will have brought about a very useful exchange of opinions between manufacturers and engineers. It will be, however, a question of some time yet, before a general assent to the specifications can be obtained. It looks as if they would be received by railroads with much caution and not without additions to cover supposed loopholes for lax practices.

The specifications so far as adopted are as follows:

PROPOSED STANDARD SPECIFICATION FOR MATERIAL AND WORKMANSHIP OF IRON AND STEEL STRUCTURES.

[As amended at the Pittsburgh Convention of Bridge Manufacturers and Engineers, Pittsburgh, March 16. Additions to the original draft made by amendments at the meeting are shown in *italics*. Omissions from the original draft are given in parentheses:]

QUALITY OF MATERIALS.

WROUGHT IRON.

1. All wrought iron must be tough, *ductile*, fibrous and of uniform quality for each class, *straight*, *smooth*, free from injurious flaws, *buckles*, blisters or cracks (and must have a workmanlike finish; but) As the thickness of bars approaches the maximum that the rolls will produce, the same perfection of finish will not be required as in thinner ones.

2. No specific process or provision of manufacture will be demanded, provided the material fulfills the requirements of this specification.

3. The tensile strength, limit of elasticity and ductility shall be determined from a standard test piece, not less than ¼ in. in thickness, cut from the full-size bar, and planed or turned parallel; if the cross-section is reduced, the tangent between shoulders shall be (at least 12 times its shortest dimension) *ten inches*, and the area of minimum cross-section in either case shall be not less than (one-half) *one half* of a square inch and not more than (one) *three quarters of a* square inch. Whenever practicable, two opposite sides of the piece are to be left as they come from the rolls, but the finish of opposite sides must be the same in this respect. A full-size bar, when not exceeding the above limitations, may be used as its own test piece. In determining the ductility the elongation shall be measured, after breaking on an original length of (12 times the shortest dimension of the test piece) *eight inches*, which length must include the curve of reduction on both sides of the point of fracture.

4. All iron to be used in the tensile members of open trusses, laterals, pins and bolts, except plate iron over 8 in. wide and shaped iron, must show by the standard test pieces a tensile strength in pounds per square inch of:

$$\left(52{,}000 - \frac{7{,}000 \times \text{area of original bar}}{\text{circumference of original bar}}\right)$$

$$51{,}000 - \frac{4{,}000 \times \text{area of bar}}{\text{circumf. of bar}}$$

with an elastic limit not less (than one-half the strength given by this formula) *than* 26,000 *pounds per square inch*, and an elongation of (20) 18 per cent. [Close vote of 10 to 12 on these amendments.]

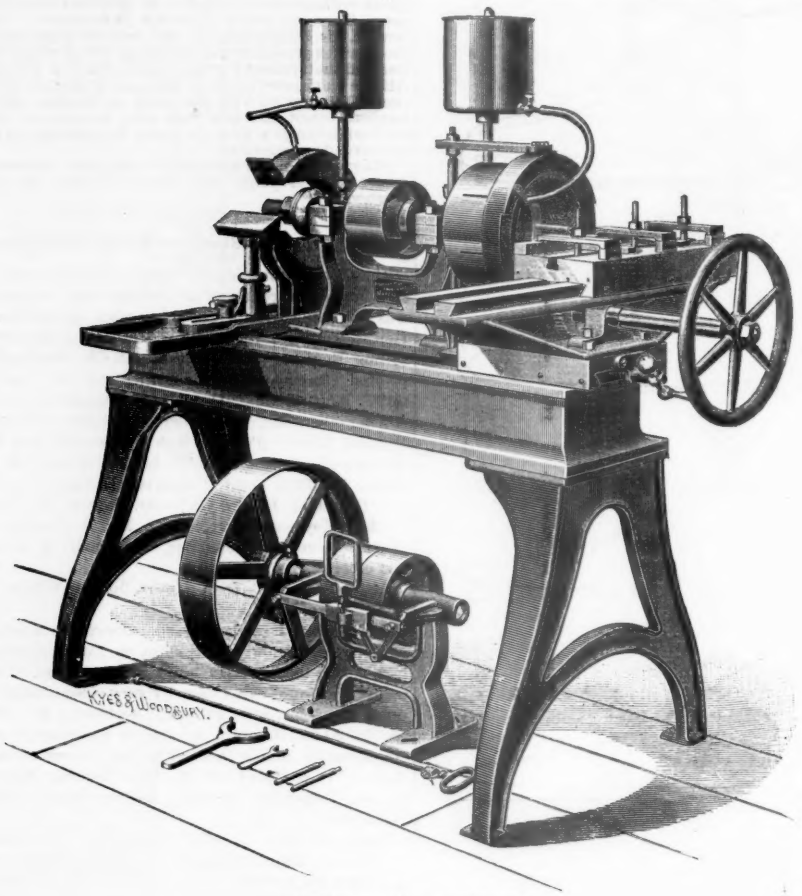
5. Plate iron must show by the standard test pieces a tensile strength of 46,000 pounds per square inch, with an elastic limit not less than 23,000 pounds per square inch, and an elongation for plates 24 inches wide and under, of 10 per cent., and for plates over 24 inches wide, of 5 per cent., and when used in tension members shall show an elongation of 12 per cent.

6. All shaped iron and other iron not hereinbefore specified must show by the standard test pieces a tensile strength in pounds per square inch of:

$$49{,}000 - \frac{7{,}000 \times \text{area of original bar}}{\text{circumference of original bar}}$$

with an elastic limit of not less than one-half the strength given by this formula, and an elongation of 12 per cent. for bars ⅝ in. and less in thickness, and of 10 per cent. for bars of greater thickness.

7. All places, angles, etc., which are to be bent hot, in the manufacture must, in addition to the above requirements, be



IMPROVED KEY GRINDER.

Made by the NORTHAMPTON EMERY WHEEL CO., *Leeds, Mass.*

capable of bending sharply to a right angle at a working heat without sign of fracture.

8. All rivet iron must be tough and soft, and pieces of the full diameter of the rivet must be capable of bending cold until the sides are in close contact without sign of fracture on the convex side of the curve.

9. All iron specified in clause 4 must bend cold 180 degrees, without sign of fracture, to a curve the inner radius of which equals the thickness of the piece tested.

10. Specimens of full thickness cut from plate iron, or from the flanges or webs of shaped iron, must stand bending cold through 90 degrees, to a curve the inner radius of which is one and a half times its thickness, without sign of fracture.

Number of Test Pieces.—11. For each contract four standard test pieces and one additional for each 50,000 lbs. of wrought iron will, if required, be furnished and tested by the contractor without charge, and, if any additional tests are required by the purchaser, they will be made for him at the rate of $5 each; or, if the contractor desires additional tests, they shall be made at his own expense, under the supervision of the purchaser, the quality of the material to be determined by the result of all the tests in the manner set forth in the following clause.

12. The respective requirements stated are for an average of the tests for each, and the lot of bars or plates from which samples were selected shall be accepted if the tests give such average results, but, if any test pieces give results more than 4 per cent. below said requirements, the particular bars from which they were taken may be rejected, but such tests shall be included in making the average. If any test piece has a manifest flaw its test shall not be considered.

13. The inspection and tests of the material will be made promptly on its being rolled, and the quality determined before it leaves the rolling mill. All necessary facilities for this purpose shall be afforded by the manufacturer; but, if the inspector is not present to make the necessary tests *after due notice given him* (and the contractor is not notified by the purchaser before the material leaves the mill what number and character of tests will be required), *then the contractor shall proceed to make such number of tests of the iron, then being rolled, as shall have been agreed upon, or in the absence of any agreement, as provided by Section* 11. *by a sworn inspector*, and the quality of (the) *such* material shall be assumed to be satisfactory.

14. A variation in cross section or weight of rolled material of more than 2½ per cent. from that specified may be cause for rejection.

STEEL.

15. No specific process or provision of manufacture will be demanded, provided the material fulfills the requirements of this specification.

Test Bars.—16. From three separate ingots of each cast a round sample bar, not less than ¾ in. in diameter, and having a length not less than twelve diameters between jaws of testing machine, shall be furnished and tested by the manufacturer without charge. These bars are to be truly round, and shall be heated to a cherry-red after rolling, and arranged to cool uniformly, and from these test pieces alone, the quality of the material shall be determined as follows:

17. All the above described test bars must have a tensile strength within 4,000 lbs. per square inch of that specified by the purchaser, and an elastic limit not less than one-half of the tensile strength of the test bar, and for steel having a tensile strength of 60,000 lbs. per square inch, an elongation of not less than 20 per cent. in a length of 12 diameters, with a reduction of area at the point of fracture of not less than 35 per cent., decreasing to 12 per cent. elongation, and 25 per cent. reduction of area as the tensile strength increases to 90,000 lbs. In determining the ductility the elongation shall be measured after breaking on an original length of twelve times the shortest dimension of the test piece, which length must include the curve of reduction on both sides of the point of fracture.

Bending Test and Reduction of Area.—18. Finished bars must be free from injurious flaws or cracks and must have a workmanlike finish, and round or square test pieces cut therefrom when pulled asunder shall have reduction of area at the point of fracture as above specified, and that having 60,000 lbs. tensile strength measured by the test piece from the ingot, must bend without crack or flaw 180 degrees to a curve having a radius equal to half its shortest dimension, and that having 90,000 lbs. tensile strength must bend 180 degrees to a curve having a radius equal to twice its shortest dimension.

19. For each contract four such tests respectively for reduction of area and for bending, and one additional of each for each 50,000 lbs. of steel, will, if required, be made by the contractor without charge; and if the purchaser is not satisfied that the reduction of area test correctly indicates the effect of the heating and rolling, such additional tests for tensile strength limit of elasticity and ductility as he may desire will be made for him on test pieces conforming to the provisions of clause 3, at the rate of $5 each, or, if the contractor desires additional tests, he may make them at his own expense, under the supervision of the purchaser, the quality of the material to be determined by the result of all the tests in the manner set forth in the following clause.

20. Except for tensile strength, the respective requirements stated are for an average of the tests for each, and the lot of bars or plates from which samples were selected shall be accepted if the tests give such average results, but if any test pieces give results more than 4 per cent. below said requirements, the particular bars from which they were taken may be rejected, but such tests shall be included in making the average. If any test piece has a manifest flaw, its test shall not be considered.

21. Rivet steel, shall have a specified tensile strength of (58,000) 59,000 lbs. per square inch, and test bars must have a tensile strength within 4,000 lbs. per square inch of that specified, an elastic limit of not less than one-half of the tensile strength, an elongation of 25 per cent. in twelve diameters, with a reduction of area at the point of fracture of 45 per cent., and be capable of bending double, flat, without sign of fracture on the convex surface of the bend.

22. The inspection and tests of the material will be made promptly on its being rolled, and the quality determined before it leaves the rolling-mill. All necessary facilities for this purpose shall be afforded by the manufacturer; but, if the inspector is not present to make the necessary tests, and the contractor is not notified by the purchaser before the material leaves the mill what number and character of tests will be required, the quality of the material shall be assumed to be satisfactory.

23. A variation in cross section or weight of rolled material of more than (2½) 1½ per cent. *below and* 3 *per cent. above* that specified may be cause for rejection.

CAST IRON.

24. Except where chilled iron is specified, all castings shall be of tough gray iron free from injurious cold shuts or blow holes, true to pattern and of a workmanlike finish. *Sample pieces one inch square, cast from the same heat of metal in sand molds, shall be capable of sustaining on a clear span of 4 ft. 6 in., a central load of 500 lbs. when tested in the rough bar.*

The remainder of the specifications were under discussion when our report closed.

Improved Key Grinder.

Although solid emery wheels have been in use for more than 30 years, and their qualities are well understood by most metal workers, but few men, even among skilled mechanics, realize to what extent implements made of emery and corundum can be used in doing the most difficult work on metals. With suitable machinery, a large portion of the work now done on planers and milling machines, and with the file, can be more cheaply and better done by the use of solid emery or corundum wheels, than by any other known method.

Within the last few years efforts have been made to perform some of the finer and more accurate mechanical operations with emery wheels, which formerly were not regarded as tools for accurate work, simply because the work has been applied to the periphery of the wheel only; and as the diameter of the wheel and form of its face changed with every movement of its use, work could neither be accurately ground nor duplicated on it.

A machine constructed to do accurate work and duplicate it, by the use of solid emery wheels, was built by the Northampton Emery Wheel Co. in 1875 and patented in 1876. It was designed for sharpening planer knives, and was a new departure from all former methods. The article being ground was passed across the end of an emery or corundum cylinder instead of the periphery of a wheel, so that the wearing away or even alteration in the shape of the grinding cylinders did not affect the accuracy nor uniformity of the work, nor the speed of the cutting implement.

The accompanying cut represents one of the many machines built by the above-named company on the plan described. It is called a "key grinder," but, as any skilled mechanic will see, is adapted to a great variety of work in machine and tool shops, or wherever it is required that metals of any kind shall be brought to a straight surface. It is designed for grinding straight knives and cutters, straightening the edges of brass and iron strips and plates, and steel, either before or after hardening; also for squaring nuts, bolt heads and similar work.

The grinding cylinder is carried in a strong iron chuck which insures it against breaking. This cylinder works equally well on either hard or soft metals, one of the greatest advantages in its use being that work can be perfected on it after tempering. The machines are made of different sizes, and to accommodate work up to 40 in. in length.

Any further particulars can be obtained from the Northampton Emery Wheel Co., of Leeds, Mass., or No. 20 South Canal Street, Chicago.

THE SCRAP HEAP.

Forgot Where She Was.

"Madam," said a gentleman to a stout old lady, who was laboriously climbing the elevated railway stairs at the City Hall station, "if you were to grasp the railing I think you would find your journey somewnat easier."

"Thank you," she replied, as she followed his suggestion. "You see, sir," she explained, "I live in Pittsburgh, and no one ever thinks of touching a railing in that city. For the moment I forgot I was in New York. Thank you, sir!"—*New York Sun.*

Killed by the Wind.

During the high winds of last week, Cornelius Coughlin, a brakeman, while shifting cars on the Boston & Lowell Railroad near Craigie's Bridge, was blown from the top of a car into the Charles River and drowned.

A Bridge With a History.

The Wilmington & Weldon Railroad Co. is making preparations to build an iron bridge across the Neuse River near Goldsboro, N. C., in place of the wooden structure which has stood there ever since the war. The bridge which is now to be replaced succeeded an old-fashioned wooden truss bridge, housed over, which was burned in December, 1862, during one of the sharpest of the minor actions of the war, the marks of which the writer carries about him until this day. In one sense the action was a drawn battle, as neither party ran away, but in another it was successful, for during its continuance the bridge was set on fire by a lieutenant of the Third New York Cavalry and two privates of the Ninth New Jersey regiment, who managed to reach the bridge under cover of the railroad embankment, and succeeded in burning it, although it was covered by two confederate batteries and a brigade of infantry, not 200 yards away. The three bridge burners escaped with their lives, although two of them were wounded, but the lapse of 24 years has unfortunately effaced their names from memory.

Curbing the Train-Boy.

The traveling public will have occasion to thank the officers of the New York, Lake Erie & Western Co., who have adopted a rule forbidding train-boys to solicit custom by depositing books, packages, etc., in passengers' laps and seats. The train-boy is to some extent a necessary nuisance, but when he adopts the practice technically known, we believe, among the fraternity as "lapping," he becomes unbearable, and this order will be a new inducement to passengers to take the Erie.

Elephants versus Wrecking Cranes.

If the following story in the New York *World* is correct, elephants will soon become an essential feature of a wrecking train:

"A fast freight on the Pennsylvania road ran into another freight six miles south of Bristol on March 13. The elephants 'Chief' and 'Queen' were in the car just behind the locomotive, and the water tank of the engine slid into the forward compartment of the car, rolling everything in that part into the compartment which 'Chief' occupied. At the same time a heavy flat car slipped into the elephant's car from behind. 'Chief' braced himself against the confused mass of elephant and keeper, smashed wood and water tank behind him and received the flat car on his forehead, pushing against it with all his might. It was fully five minutes before 'Chief' could be persuaded that it was no longer necessary to hold the car up. Then, with wild trumpetings, he proceeded to demolish the flat car, but his keeper and the flames of the wrecked cars behind him compelled him to desist. Neither elephant was hurt much, and they tramped to Frankford, 12 miles. 'Chief' undoubtedly saved the life of his mate and their keeper."

A Fatal Train Robbery.

On the night of March 12, train robbers made their way into the express car of a passenger train on the Chicago, Rock Island & Pacific road, and somewhere between Joliet and Morris killed the express messenger and robbed the safe of its contents, estimated at about $50,000, in money and valuables. How they got into the car, the end doors of which were locked, is not known, nor has any clew so far been found as to the robbers. The first intimation that they were on the train was received by the baggage-man, whose car was next to the express car, and who, when about half-way between Joliet and Morris, heard a rap on the door of his car. Believing it to be the express messenger, he opened the door and was met by three masked men, who covered him with revolvers and demanded his key to the express car. The key was given up and the baggageman himself was tied fast by the men and knew nothing more until the train stopped at

Morris, when he gave the alarm. The express car was at once opened and the dead body of the messenger found, with the papers from the safe scattered upon the floor.

A reward of $10,000 has been offered for the capture of the murderers, and a number of detectives are hunting for them, but have up to date found no trace.

A Singular Accident.

A singular accident occurred on the Lehigh Valley Railroad on March 13. A new locomotive just completed was making a trial trip over the road, but in passing under a highway bridge at Hokendauqua the smoke-stack, being too high, struck the lower chord of the bridge, and was torn from its fastenings and thrown back upon the cab. It struck the cab with such violence that it crashed through the roof and front, striking Engineer Thomas Moore on the head and killing him instantly. The fireman was also struck and severely bruised, but not receiving the blow directly escaped with his life.

A Satisfactory Final Estimate.

Contractor Cavan, having completed the first section on the Pottsville & Mahanoy Division of the Pennsylvania Schuylkill Valley road, celebrated the occasion by entertaining his friends at the Merchants' Hotel last evening.

The following "specifications" posted on the wall of the dining room will give the reader an idea of the magnitude of the evening's contract.

FINAL ESTIMATE LAY OUT.

Friday, March 12, 1886.

Soup.

Macaroni with St. Clair Whisky.

Fish.

Mill Creek Trout—Mud Run Sauce.

Boiled.

Cavandale Bacon with Laurel--Mule Shoulders, with Coon's Ears.

Roast.

Horsehide, all over mud—Ribs of Italians—Hungarian Gravy.

Entrées.

First-class Masonry, à la Maître de Cavan—Sirloin of Virginia Darky, Stewed with Grout—Culvert Fritters—Mumm's Extra Dry Sauce.

Vegetables.

Broken Ballast—Dead Beats—Broiled Conglomerate—Broken Rails.

Relishes.

Engineer's Classification—Chief Engineer's Sauce—Cavan Catsup.

Pastry.

Horse Chestnut Pie—Improved Anchor Cement, with Rosendale Dressing.

Dessert

Whisky—Champagne—Profit on Work—Box of Cigars and Chin.

Finale.

"*Let the Band Play.*"

—*Pottsville Miners' Journal, March* 13.

TECHNICAL.

Locomotive Building.

The Baldwin Locomotive Works in Philadelphia are building several locomotives for the new Annapolis & Baltimore Short Line.

The Rogers Locomotive Works in Paterson, N. J., are completing an order for standard gauge locomotives for the Louisville & Nashville road.

The Canadian Locomotive Works in Kingston, Ont., are building 10 locomotives for the Canadian Pacific, 2 for the Pontiac & Pacific Junction and 2 for the Quebec & Lake St. John road.

The Car Shops.

The New York Central & Hudson River Co. last week let contracts for 50 new passenger cars, of which 20 are to be built by the Barney & Smith Manufacturing Co. in Dayton, O.; 18 by the Jackson & Sharp Co. in Wilmington, Del., and 12 by the Gilbert Car Co. in Troy, N. Y. All of these cars are to be supplied with the "Perfected Baker Heater," made by the Baker Heater Co., of No. 72 Broadway, New York.

The Wason Manufacturing Co. at Brightwood (Springfield), Mass., is building several passenger cars for the Annapolis & Baltimore Short Line.

The Marshall Car & Foundry Co. in Marshall, Tex., has closed a contract to supply all the car wheels and castings for the Texas & Pacific road.

The Ensign Manufacturing Co. in Huntington, W. Va., is building the freight cars for the new Annapolis & Baltimore Short Line.

The new board of the St. Charles Car Co. in St. Charles, Mo., have elected Wm. H. Glasgow President; Henry B. Denker, Vice-President; T. C. Salveter, General Manager; D. Shuitz, Secretary.

Bridge Notes.

The Rochester Bridge & Iron Works of Mr. John F. Alden have taken the contract to build a wrought-iron bridge over Tonawanda Creek for the New York Central road.

Iron and Steel.

The Cole Manufacturing Co., in Lake Village, N. H., is running its steam forge double turn on a contract for 1,200 car axles.

The Old Dominion Iron Co. in Richmond, Va., is running its rolling mill on an order of bar iron for 500 cars to be built by the Roanoke Machine Works.

The Eastern Forge Co. in Portland, Me., is making forgings for 12 locomotives for the Portland Co. The company has recently received an order for the forgings for 25 locomotives to be built in Providence.

The blast furnace in Steubenville, O., which was recently bought by the Riverside Iron Works, of Wheeling, W. Va., has been thoroughly repaired, and went into use last week.

A 10-ton Bessemer plant complete and a 25-inch rail train, with a 2,000 H. P. engine to drive the same, are among the new additions to the plant of the Union Steel Co. This company has also rebuilt two blast furnaces, having each a capacity of 100 tons per day. The blast furnaces of the company are now ready to blow in as soon as a supply of coke can be had. Up to Jan. 1 last over half a million dollars had been expended in improving these works. It is the purpose to have the entire plant in running order by June 1 next.—*Chicago Industrial World.*

A new blast furnace is to be built at Etna, Tenn., on the Nashville & Tuscaloosa road. It will be a charcoal furnace.

Warner Furnace at Warner, Tenn., is in blast, making 45 tons of charcoal iron daily.

The Shoal Creek Iron Co. has been organized to build a blast furnace at Columbia, Maury County, Tenn. Work is to be begun on the new furnace at once.

Manufacturing and Business.

J. S. Mundy, builder of hoisting engines, is enlarging his shops in Newark, N. J., the addition being 25 by 84 ft. and four stories high.

Cramp & Sons are now building at their ship-yard on the Delaware a large steamer for Morgan's Louisiana & Texas Co., and a ferry-boat to run between New York and Jersey City for the New York, Lake Erie & Western Co. They have taken contracts for two steamers for the Clyde lines.

The Bucyrus Foundry & Manufacturing Co. in Bucyrus, O., is increasing its facilities as fast as possible, and has ordered a number of new tools, which will nearly double the present capacity of the works. The company recently shipped a steam shovel to San Francisco and will have another to go to the same place shortly. It has a number of orders on hand for steam shovels and bridges, and the officers consider that, as far as they are concerned, the revival of business has come.

The Railway Lighting & Heating Co., 119 South Fourth street, Philadelphia, Mr. William Dawson President, has just received an order to fit up a passenger car for the Baltimore & Ohio road with its system of lighting, heating and ventilating.

The Rail Market.

Steel Rails.—Sales of a number of fair-sized lots are reported and prices are firm at $34@$35 per ton at mill, the lower rate only for large and desirable orders. The mills are so full of work that, as a rule, they are not prepared to take orders for early delivery.

Rail Fastenings.—The market is more active, but quotations continue unchanged at 2.40 cents per lb. for spikes in Pittsburgh; 2.75@3.10 for track-bolts, and 1.70@1.80 for splice bars.

Old Rails.—Old iron rails are dull, with a considerable supply on the market. Quotations are $21.50@$22.50 per ton at tidewater. Old steel rails are quoted at $22.50@$24 per ton in Pittsburgh.

Engineers' Club of St. Louis.

The club met in St. Louis March 3, President McMath in the chair, and 18 members present. The sub-committee on reception and lunch to Colonel Flad was authorized to complete arrangements and issue the necessary invitations and notices.

Mr. Robert E. McMath read an elaborate paper on the future drainage of St. Louis, outlining a complete system of sewerage for the city, intended to cover and provide for the future growth of the city. A general discussion on this paper followed, and the club then adjourned.

American Society of Civil Engineers.

At the meeting of Feb. 17, at the Society's House in New York, Mr. J. James R. Croes occupied the chair.

The deaths of two members were announced: Mr. Edward A. Flint on Jan. 23, and Mr. Louis R. Walton on Nov. 9, 1885.

A paper by Clemens Herschel, on the Work Done for the Preservation of the Dam at Holyoke, Mass., in 1885, and on some studies for a new stone dam for the same place, was read by the author and discussed.

At the meeting of March 3, Mr. W. Howard White occupied the chair.

The following candidates were elected as Members: Danforth Hurlburt Ainsworth, Newton, Ia.; Decatur Axtell, Richmond, Va.; William Herbert Burr (elected Junior June 3, 1874; elected Associate May 5, 1880), Phœnixville, Pa.; Albert Lucius, Brooklyn, N. Y.; Robert Edwin Peary, Washington; Charles de la Chervis Purdon, Van Buren, Ark.; James Robert Wardlaw, New York. As Associate: Clayton Colman Hall, Baltimore. As Junior: George Washington Vaughan, Steubenville, O.

A paper by Fred. Brooks, on Thermometer Scales, was read and discussed. The author advocates the discontinuance of the use of the Fahrenheit scale for temperature, and the adoption for all uses of the centigrade scale. There are few or almost no obstacles to this course. Conversion tables are abundant; its use is more especially for scientific purposes; national prejudices are not excited; it is independent of other measurements: the centigrade scale is already largely used, and it can be used by any one at once without a date being fixed in advance for its universal adoption.

A paper by H. V. Hinckley, on Errors in Railroad Levels was read. The character of the leveling on the Atchison, Topeka & Santa Fe Railroad having been called in question, the author took measures to check the correctness of the levels by direct search and by checks from intersecting roads and reliable benches. The results are summarized in the paper.

Western Society of Engineers.

The 222d meeting was held in Chicago March 2, President Wright in the chair. Messrs. C. L. Strobel and G. F. Samuel were elected members. The Secretary announced the receipt of photograph likenesses from Messrs. D. J. Miller and A. Comstock

Mr. Palmer, for the Committee on Entertainment of the American Society of Mechanical Engineers, reported progress.

Mr. Cooley, for Committee on National Public Works, stated that the co-operation of most of the engineering societies of the country had been enlisted and that the work of the committee was progressing satisfactorily.

The two amendments to the By-Laws proposed at the meeting February 2, were, upon ballot, adopted.

Mr. Morehouse called up the suggestion made some time ago by Mr. Zellweger that questions propounded by members be referred to special committees for answer, and a resolution was adopted that all such queries be placed in the hands of the respective topical committees for investigation and reply.

Upon motion of Mr. Cregier the President was requested to revise the Standing Committees.

Two papers were read and discussed: Pile Driving, by Mr. E. H. Beckler, and Tests of Power of Locomotives, by Mr. C. H. Hudson.

The Secretary announced the death of Mr. E. B. Talcott, one of the oldest members of the Society, and the Chair, by request, appointed Mr. W. S. Pope a committee to draft a memorial paper.

Mr. Cooley offered the following amendment to by-laws:

"In place of the term 'Contributing Member' insert 'Associate,' and in place of the word 'Associate' insert 'Junior,' wherever said words 'Contributing Member' and 'Associate' appear in the Constitution and By-Laws."

The Club then adjourned.

At the April meeting two papers will be presented: Truss Bridges of Long Span, by Mr. J. Freeman Clarke, and A Revised Time Table for Lighting Public Lamps, by Mr. J. M. Howells.

The New Bridge at St. Paul.

The St. Paul (Minn.) *Globe* of March 11 thus describes the new bridge which the Morse Bridge Co. is now erecting in that city: "Work on the Robert street bridge is going forward as fast as is consistent with the nature of things. The last of the iron for the big span arrived yesterday from Youngstown, O., 15 cars loaded with this material having been sent through to St. Paul by special train. The big span which carries the roadway over the railroad bridge will be the longest and highest span in any highway bridge in the West. It is 350 ft. long, and the truss will be 60 ft. high above the roadway, and the roadway is 90 ft. above the river. This single span requires 800 tons of material (about one-third of the whole bridge), will support a load of 1,050 tons, and the work of constructing it is, on account of its height, about half the work of the whole bridge. The span is constructed after a new design, and contains less material for the load it will carry than any span ever erected, the plan being original with the builders. It is impossible to state just what time the bridge will be open for travel. Mr. S. V. Ryland, the Superintendent, says that it ought to be opened some time in June, but he cannot tell about the completion, as there may be delays; that it is possible the ice may go out of the river and knock the trestle-work from under, etc. He says that about two weeks' time will be consumed on each span after the big one is finished, and there are seven more spans to build. There are now at work 120 men and three stationary engines, and 800,000 ft. of lumber is required in the construction. The mason-work, over which there has been so much trouble, is not yet completed, two piers being yet too low and considerable pointing remaining to be done."

Telegraphing from Moving Trains.

A trial of the system of sending and receiving telegraph messages on trains in motion, which is being introduced by the Edison Railway Telegraph & Telephone Co., is to be made on the Chicago, Milwaukee & St. Paul road March 19, when a special train will be run from Chicago to Milwaukee and return for the purpose of testing and exhibiting the system.

American Locomotives in Brazil.

A letter in *Engineering* (London) states that American locomotives have of late years been rapidly gaining favor in Brazil. A few years ago we hardly had an American locomotive in Brazil. Now most of the Brazilian companies prefer the Baldwin to any other. In the Government railway, the Dom Pedro II., there are 118 locomotives; of these only 18 are English, 1 Belgian, and 1 French; 98 are American. In the next largest railway line, the Leopoldina, out of 25 locomotives in traffic only 9 are not American. And yet no political or other influence of the kind has determined the preference. The agent of the Baldwin Works was an obscure American commission merchant, and at present the Philadelphia house is represented in Brazil by a most respectable English firm, that of Messrs. Norton & Megaw, who also represent Messrs. Lamport & Holt, the celebrated shipowners.

Refrigerator Cars.

The Lehigh Valley Railroad Co. is building 50 Tiffany refrigerator cars at the Packerton shops. California fruit is now being shipped from Los Angeles by the Santa Fe route and the Lackawanna fast freight line in 12 days to New York. This business has received an impetus from the failure of the Florida crops this year.

Holding the Fire Fifteen Months.

The failure of the Kemble Iron & Coal Co. caused a suspension of operations at their works, at Riddlesburg, in November, 1884. One of the furnaces was then banked up and hermetically sealed, fire being left in. On March 5 the furnace was opened for the first time, having been closed for nearly 16 months. The fire was found to be still burning, the coke glowing brightly, and on the admission of air soon became hot enough to melt cinder. It was as easy a matter to start the furnace as if it had been standing but a week. This is believed to be one of the longest instances in which fire has been kept in a furnace without the addition of fuel.

New Railroad Shops at St. Paul.

The *American Machinist* gives the following particulars of some new railroad shops that are about to be built at St. Paul:

The new shops of the St. Paul & Duluth will be built a mile or two from the old shops. Between the machine shop, 200 × 85 ft., and the car shop of the same size, will run a transfer table the whole length. The boiler shop will be 50 × 85 ft.; wood shop, 75 × 85 ft.; blacksmith shop, 60 × 85 ft.; the paint shop, 50 × 100 ft.; and the storeroom and offices, 50 × 150 ft. The arrangement of shops is good and convenient. A new round-house of 10 stalls has already been erected. Ten more stalls will be added. The machinery now in use is good, and will be removed to the new quarters as soon as they are ready, but it is uncertain yet when the work of construction will begin.

The Minnesota & Northwestern Railroad will soon proceed to erect new repair shops for locomotives and cars just outside the city limits. The shop plans involve the erection of a 17-stall round-house; a machine shop 130 × 300 ft.; a car erecting shop 130 × 300 ft.; a wood working shop 60 × 300 ft.; a paint shop 115 × 300 ft.; a boiler shop 60 × 250 ft.; a blacksmith shop 55 × 265 ft., and several smaller buildings. Only a section of these shops will be erected this year. Some $20,000 worth of new machinery has already been ordered, and more will be required. The road has 36 locomotives, including some ordered to be completed next month. The lines are to be greatly extended, and the shops are planned to meet future requirements.

A Plucky Inventor.

The French railway companies are at last yielding to the pressure of public opinion, and increasing the speed of their trains, the train from Paris to Boulogne having reached a speed of 42 miles per hour, which is considered marvelous. Nevertheless, they are most reluctant to accelerate their service, on account of the extra cost high speed entails, considering their pockets more than the convenience of the public. Holding the opinion that the tractive power required can be much reduced by increasing the size of the wheels, and that he cannot convince the companies of this without actual trial, a French private gentleman, Mr. Estrade, has had a locomotive, tender and train of carriages constructed to his ideas, which he proposes, shortly, to try on the Southern Railway of France. The locomotive has three coupled axles, the wheels being all 2¼m. (8 ft. 2⅛ in.) in diameter, and has cylinders 19 in. diameter and 28 in. stroke, weighing, in working order, about 42 tons. The carriages have two axles and wheels of the same enormous diameter, with 15-ft. wheel base. The great height of the axle and wheel necessitates, of course, a different construction, the carriages being in two stories, with lower compartments at the ends and between the wheels, and an upper floor reached by staircases at the ends. We admire Mr. Estrade's pluck in backing up his notions with a very considerable outlay of money, but certainly should not care to ride on his engine or in his carriages at 50 miles an hour, or even much less than that. Independently, however, of the danger arising from the high centre of gravity, and the large diameter of the wheels, combined with a long, rigid wheel base, he has evidently mistaken the nature of the obstacles to high speed, among which the axle friction cannot be reckoned. The power required to overcome this increases in the simple ratio of the speed, while the air and other resistances increase as the square or cube of the velocity. And although the power required increases, the work consumed in axle friction does not; for a given distance, the axle makes the same number of revolutions whether the train moves slowly or fast, and if the steam is as economically got up and used in one case as the other, the portion of the cost falling upon the axle friction is the same in both cases. If there were no other resistances, high speeds would be more economical than low ones, as the plant would be better utilized; but, practically, the reverse is the case. We therefore do not think that the inventor will reap much success for his expenditure, even if he can find people willing to risk their necks in trying his train at a high speed.—*Mechanical World.*

RAILROAD GAZETTE

Published Every Friday.

EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

REGULATING RATES IN MINNESOTA.

The Minnesota Railroad Commission last fall sought to reduce the rates on grain and other farm produce, and then selected those of the Manitoba road as being the lowest of the lines west of Minneapolis. Now it is announced that the Commission proposes to reduce the rates, not of the railroads generally, but of the Manitoba alone, because it has made large profits, the rule apparently being one that "works both ways" with a vengeance, warranting the reduction of rates of a prosperous road because it is prosperous, and then warranting a reduction on the unprosperous roads to put their patrons on an equality with those who live on the prosperous road.

The St. Paul *Pioneer-Press* seems to indorses both policies, saying that merchandise rates from St. Paul westward seem to be too high, and ought to be reduced, not only on the Manitoba, but on all the roads. "Certainly," it says, "if the rule adopted by the Commission in relation to grain rates, which enforced the lowest indiscriminately upon all the rest is a just one, a reduction of the rates on merchandise should also apply to all roads alike." But in the very next paragraph it says:

"But in the case of the Manitoba it appears that a new and, it seems to us, a better principle, is to be adopted, provided it is made of universal application, and not limited to one road. Its rates are to be cut down, not because they are higher than on other roads, for that was not alleged, but because with the rates charged it has been enabled to earn a considerable surplus. To reduce the rates so that it shall have no surplus, it will be necessary, then, to adjust them to the volume of traffic on the road, for it is mainly due to its larger volume of traffic that this road is enabled to earn a surplus, while some others with less business may be hardly able, with the same tolls, to pay the interest on their bonds. Now if this principle is to be adopted, it should not be limited in its application to one road, but extended to all within the state. A schedule of rates must then be made for each road, varying according to the actual financial condition of each, its business, its operating and other expenses. This is probably the only just principle on which freight rates can be regulated—that is to say, instead of attempting to enforce a uniform standard of rates, as was done in the case of grain, to adjust them to the particular circumstances of each road. The enforcement of this principle would not be as popular, perhaps, as the compulsory reduction of rates on all roads to the level of the lowest on any line without regard to its earnings or its expenses, but it would be more equitable."

If the profits of a railroad company in Minnesota are to be limited to ordinary interest on the capital invested, notice should have been given before the capital was invested, in which case no one need have lost by it, as certainly no one would; for all railroads are necessarily risky enterprises, and Minnesota railroads when built were emphatically so. It was about the year 1873, we believe, that the Minnesota Legislature was proposing important reductions of railroad rates, and then a study which we published at the time showed that not a railroad in the state was earning the interest on its bonds. For some of the lines this was the case for nearly ten years. Certainly Minnesotians ought not to forget that more than forty millions invested in the bonds of the Northern Pacific Company, and on its failure made preferred stock, has received but 11 per cent. interest in the course of 13 years; nor the fate of the St. Paul & Pacific, whose assets after foreclosure were transferred to the now prosperous St. Paul, Minneapolis & Manitoba. Indeed, that the latter now earns more than the average rate of interest on its capital is due largely, if not chiefly, to the fact that it got the St. Paul & Pacific property for very much less than it cost, and, as it turned out, still further below its value, the most valuable part of this property being, probably, the land, which only became marketable after the foreclosure. The profit on the lands could have been made just as well by any one else as by the Manitoba Company, for they were all in the market at prices but a small part of what they have sold for recently. If all the people who lost their money by investments in St. Paul & Pacific and Northern Pacific securities lived in Minnesota, probably the proposition to limit the profit on railroad investments to the current rate of interest on loans would meet with a storm of opposition, such as might be expected were the profits on investments in flour and saw-mills limited to 6 or 7 per cent., and for the same reason, that the investment was attended with great risks, and that the only justification for making such investments is the possibility of making much more than the ordinary rate of interest. The $1,000 invested in a Northern Pacific bond in 1873, at the rate of interest which it promised (7.3 per cent.), would have amounted at this time to about $2,390, after allowing for the single scrip dividend paid in 1882, and if this was a legitimate investment, which no one questions, the preferred stock *has cost* $239 per share at this time. When the Northern Pacific gets income enough to pay dividends on this stock, to limit them to 6 per cent. would be really allowing the investors only 2½ per cent. on their money, and none the less because the people to whom the cost was 239 may have sold out for 60 or less.

This is a case where the investors have actually suffered great losses, and are not likely ever to get as much as the current rate of interest on their investment; they accepted risks and suffered, and it is because such risks are common and often suffered that those who put their money in railroads may justly claim more than the average rate of interest when their road is able to earn it. Certainly there never would be any railroads built if the only chance permitted to the investor were the chance of loss. Imagine a community making this proposition to a capitalist: "We want a railroad. Experience indicates that if you will build us one, in the course of from three to ten years it will be able to earn interest on its cost, and if it does we will permit you to take it, but not more than the average rate of interest may be at that time." Practically the answer would be:

"If I take the risk of probably going without interest on my money for years, and of possibly losing it altogether, as many have done in your community, I must have the privilege of receiving profits as large as are obtained in other enterprises with similar risks, which you know are frequently two or three times the ordinary rate of interest. Otherwise I shall put my money into such enterprises and build no railroads." Unfortunately for the investor, the community never takes this position until it has got its railroads.

There is one other way for a community to get railroads, and that is to abolish the risks to the investor by guaranteeing the current rate of interest from the beginning, as has been done in many countries, notably in Russia and India. In such cases the public takes all the risks, and is entitled to the use of the railroads for ordinary interest on their cost. Practically this policy has not turned out well, because the managers of the railroads have too little motive to make improvements and reduce expenses, with the result that while the community may pay a low rate of interest on the railroad capital, it pays higher rates for transportation than are charged by companies which earn greater profits.

Of course, no reduction of the rates of a prosperous railroad can be made without affecting the rates of adjacent lines, whether prosperous or unprosperous. If rates on the Manitoba, which earns good dividends, are reduced, rates on the Northern Pacific, which barely earns its fixed charges, must be reduced also, not only to all points common to it and the Manitoba, but to scores of other points at some distance from Manitoba stations; for if the rate on wheat from a Manitoba station, 20 miles from a Northern Pacific station, is a few cents the lower, the farmers will bring their wheat to the station whence the rate is lower from nearly all the territory between the two roads; and so with other things. The risk that a competitor may compel reductions of rates in this way is one which is inherent in the nature of the business, and is not to be complained of when it comes naturally; and prosperous railroads all over the country limit the changes of their unprosperous neighbors; but when the prosperous road has its rates reduced by law so as to keep its profits down to ordinary rates of interest, the result must be that unprosperous railroads in the same territory can never become prosperous, and that fair profits can be earned only by lines which are exceptionally well situated.

THE CHICAGO & ALTON REPORT.

The Chicago & Alton Railroad has been notable for the good showing which it has made in bad times. When railroad business was generally getting worse, from 1881 to 1884, it gained instead of losing, and that without any addition to mileage, such as nearly every other important Chicago road had. How its gross earnings compared with some of its neighbors is shown below:

	1881.	1882.	1883.	1884.
Chicago & Alton.	$7,557,740	$8,215,495	$8,810,610	$8,709,274
Miles	846	850	850	850
C., Rock I., & P.	$13,266,643	$12,189,903	$12,535,515	$12,206,911
Miles	1,381	1,381	1,384	1,384
Ch., Bur. & Q.	$21,176,456	$21,550,805	$26,110,369	$25,483,612
Miles	2,822	3,099	3,255	3,399
Ill. Cen., in Ill.	$6,733,954	$6,9 9,780	$6,074,703	$6,158,312
Miles	953	953	953	953
Chicago & N. W.	$23,864,656	$24,081 855	$25 020,024	$23,502,056
Miles	3,033	3,465	3,720	3,819

The Rock Island and the Illinois Central, like the Chicago & Alton, had substantially no change in mileage in this time, but while the Chicago & Alton had an increase in gross earnings of 15 per cent. from 1881 to 1884, the Rock Island had a decrease of 8 per cent. and the Illinois Central a decrease of 8½ per cent., while the Burlington had an increase of 20 per cent. in both earnings and mileage, and the Northwestern lost 1½ per cent. in earnings in spite of an increase of 26 per cent. in mileage. Thus the Chicago & Alton had done better than any other road, and its success was the more notable because it is one of the two roads reaching the Missouri which have not pushed out extensions into new country to feed its main line, as the Chicago, Burlington & Quincy had done in Nebraska, and the Chicago & Northwestern in Nebraska and Dakota, while the Rock Island, though it built no new road directly, built a great deal through lines which it controls and whose through traffic it receives.

The Chicago & Alton succumbed last year, at last, however, when its gross earnings were $7,993,169, being $716,105 (8 per cent.) less than in 1884 and the smallest since 1881, and only 5¾ per cent. more than in that year. This is a larger loss than any of its neighbors made last year, so far as they have reported, the Illinois Central having gained 7¾ per cent. over 1884, the Chicago & Northwestern 4 per cent. and the Chicago, Burlington & Quincy 4 per cent. The result is that a comparison with 1881 is no longer so favorable to the Chicago & Alton, but gives the following results:

	1885.	1881.	Increase.	P.c.
Chicago & Alton	$7,993,169	$7,557,740	$435,429	5.8
Illinois Cent., in Ill	6,508,112	6,733,954	(D.) 225,842	3.3
C., Burl. & Q.	26,556,425	21,176,456	5,379,969	20.3
Chicago & N. W.	24,301,058	23,864,656	4 6,402	1.8

The Alton's decrease last year was due to a reduction in traffic, the average rates being a little higher. This traffic has been, in *millions* of ton-miles and passenger miles:

	1881.	1882.	1883.	1884.	1885.
Ton-miles	447.0	474.8	549.4	602.8	538.5
Pass. miles	92.8	101.2	106.0	119.9	109.1

The decrease in freight was 10⅝ per cent., and in passengers 10 per cent. from 1884 to 1885; but there had been an interrupted growth from 1881 to 1884, amounting to 35 per cent. in freight and to 30 per cent. in passengers. It does not yet clearly appear why this road should have lost so much more than others from 1884 to 1885; but neither does it clearly appear why it should have gained more than others from 1881 to 1884.

The chief decrease in freight traffic was in through freight, and so it was with passenger traffic, the local traffic falling off from 66⅔ millions passenger miles to 64 millions, or 4 per cent., while the through traffic fell from 53⅓ millions to 45 millions, or 15½ per cent. The through travel, however, was extraordinarily large in 1884, and carried at exceptionally low rates, and as the increase in the through rate (14.7 per cent.) was nearly as great as the decrease in the through travel, the gross earnings from through travel were very little less in 1885 than in 1884, and the net earnings from it must have been larger. As there have been often great contests over the Chicago-St. Louis and Chicago-Kansas City through travel, for which this road competes, it will be interesting to see what this road's through travel has been and what returns it has yielded in different years. The through passenger mileage, the average rate per mile on it, and the gross earnings from it for five years were:

	Pass.-miles.	Rate.	Earnings.
1881	27,167,184	1.247 cts.	$339,508
1882	36,137,704	1.578 "	570,253
1883	34,015,725	1.803 "	618,303
1884	53,319,724	1.512 "	806,354
1885	45,014,584	1.773 "	798,109

Thus in spite of the great decrease of 15½ per cent. in the through travel from 1884 to 1885, it remained much larger than in any year previous to 1884, and doubtless much more profitable. Indeed, there can-

not have been much profit on this business in any of these years, except last year and in 1883, unless the cost is very much less than it is generally supposed to be. Even if we reckon that cost as little as one cent per mile, the business yielded net but $269,000 in 1884, when it was largest, which was but 7½ per cent. of the company's total net earnings. But probably the cost was as much as 1¼ cents, in which case the profit was less than $140,000.

That the reduction of 10 per cent. in passenger traffic made possible a considerable reduction in passenger expenses is indicated by the fact that the passenger train-mileage was reduced no less than 11½ per cent., or more than the passenger traffic, the average train-load having increased in spite of the great falling-off in through travel, which travel is often supposed to help greatly to keep the trains full. And there is reason to believe that the reduction was made possible largely by the falling off of through travel, because, while the mileage of ordinary coaches was reduced but ½ per cent., that of sleeping cars fell off nearly 13 per cent.

It is often claimed that the great additions to through travel sometimes caused by very low rates make little or no increase in expenses, only causing the trains to be better filled, or making them longer; but here we find a larger average train-load in spite of a great reduction in through travel.

The freight statistics are less complete, not giving the tonnage-mileage of through and local separately. We are told that 75½ per cent. of the *tons shipped* were local; but this is very little to the purpose. The *number* of local passengers was 92½ per cent. of the whole, but the local passenger mileage was but 58¾ per cent. of the whole, the average local journey being 40 miles and the average through journey 354 miles. If the average through freight haul was as long (of which we cannot be sure), the 24½ per cent. of through tons made 315 millions of the 538½ millions of ton-miles, or 58½ per cent. of the total freight traffic. But there was an increase in the number of tons, both through and local, last year, and yet a decrease of 10⅜ per cent in tonnage-mileage.

An examination of the table of the different articles of freight carried shows an increase of 9 per cent. in coal, 8½ per cent. in merchandise, 20 per cent. in iron and 39 per cent. in ice, and moderate gains in live stock, but decreases in most of the great staples of Western traffic – 56½ per cent. in wheat, 23 in flour, 22½ in corn and 27 per cent. in lumber. The average rate on all freight has been, in cents per ton per mile:

1878.	1879.	1880.	1881.	1882.	1883	1884.	1885.
1.300	1.050	1.206	1.241	1.261	1.128	1.007	1.009

Being thus a trifle higher last year than the year before, but less than in any previous year. It is a lower rate than any other Chicago road reports though the Rock Island gets but little more (1.040 cents in the year ending with March last).

Nine-tenths of the large decrease in earnings last year was in freight earnings, these falling off 10½ per cent., and the passenger earnings, owing to the higher rates, only 3 per cent. Moreover, the passenger earnings were larger than in any year previous to 1884, while the freight earnings were the smallest since 1880—2 per cent. less than in 1881, though the freight traffic was 20 per cent. larger.

The net earnings of this road have varied much less than the gross, gross and net earnings and working expenses having been for six years:

Year.	Gross earnings.	Expenses.	Net earnings.
1880	$7,687,226	$4,061,821	$3,625,402
1881	7,557,740	4,149,713	3,408,027
1882	8,215,495	4,485,881	3,729,614
1883	8,810,610	4,879,958	3,930,652
1884	8,709,274	4,886,646	3,822,628
1885	7,993,169	4,612,847	3,380,322

Thus from 1880 to 1883 the gross earnings increased $1,123,384; the net, only $305,250; and from 1883 to 1885 the decrease has been $817,441 in gross and $550,330 in net The average net earnings for the six years have been $3,649,441, and the largest have been but $281,000 more, the smallest $269,000 less than this average. The smallest were last year, however.

But in the worst years this company has abundant profits. The interest and rentals last year amounted to $1,543,780, and this left a balance of $1,836,542, which is equal to $10.44 per share of stock in this most unfavorable of recent years, besides $ .55 per share of income from investments, etc. After paying 8 per cent. dividends and $93,854 for sinking funds and $380,702 for additions to the property there remained $225,081 to be added to the surplus.

A company which is doing as well as this, is doing well enough, and the best policy for it is to reduce rates as traffic grows, preferably local rates, as by so doing it secures the growth of a traffic which cannot easily be taken away from it. The Chicago & Alton, indeed, seems to have already secured a position much like that of the southern New England roads, not likely to have a very great development (because it has no absolutely new territory to develop), but very much less liable to a great decrease in profits than the average American railroad. The contrast between it and the Wabash, which, like it, has lines from Chicago to St. Louis and from Chicago and St. Louis to Kansas City, is remarkable. Still, the Chicago & Alton is not beyond the reach of harm. Its through traffic is a very large proportion of the whole, and low as the rates on it have been in some years, the experience of the Vandalia Line and similar roads shows that they may fall still lower, and a reduction to 0.8 cent per ton per mile, which is all that many roads east of the Mississippi can get, would make a very serious reduction in its profits—nearly $1,100,000 last year. It stands on the border between the profitable and unprofitable railroads, but is one of the most profitable in the country. It is very greatly in its favor that it has already borne a great reduction in rates.

The net earnings were kept up last year by a large reduction in working expenses, which was disproportionately large in maintenance expenses. The expenses under the five heads reported have been:

	Transportation.	Motive power.	Maintenance of—Way.	Maintenance of—Cars.	General and taxes.
1880	$1,168,375	$1,149,530	$1,170,338	$379,148	$341,850
1881	1,261,139	1,121,048	1,190,933	344,368	403,887
1882	1,265,862	1,221,417	1,273,126	509,362	414,737
1883	1,359,532	1,351,316	1,302,928	656,524	447,312
1884	1,354,197	1,343,544	1,349,928	619,271	466,850
1885	1,269,025	1,247,144	1,121,560	505,629	469,409

In the report for last year, for the first time, the general expenses and taxes are distributed among the other four heads, but to make comparisons possible we have separated them, and this shows the reductions under four heads to have been:

	Transportation	Motive Power.	Maintenance of—Way	Maintenance of—Cars.
	$85,172	$96,400	$228,368	$113,642
P c.	6.3	7.2	16.9	18.4

There has been no change worth mentioning in the mileage of track and number of cars in these three years, and the reduction in the maintenance expenses is very large, but the report shows that 6.62 tons of new rails and 351 new cross-ties were put in per mile of track last year, and as four-fifths of all the track, including all the main line, were steel at the beginning of the year, the rails were probably above the average requirements. The ties were sufficient for renewal once in 7½ years, and more of both ties and rails were used last year than in 1884. The expenses for maintenance of cars have fallen from $98 per car in 1883 to $92.80 in 1884 and $75.60 last year. The total car-mileage was less last year than in 1884, but more than in 1883, having been 78½ millions in 1883, 85½ in 1884, and 80½ in 1885, so that the average expense per car-mile was 8.38, 7.24 and 6.28 cents successively, a decrease of 25 per cent. in two years.

The current year opens fairly for this road. The very poor wheat crop in Kansas tends to reduce traffic somewhat, but most of its effect was felt last year, doubtless, and the corn, the chief part of which remains to be marketed, was a good crop. There is a large emigration to Kansas, which helps the railroads in many ways, though this movement was large last year also. The construction of a large amount of new railroad in Kansas will give a considerable traffic, and if there is a revival of manufacturing industries in Illinois, such as there has been in some parts of the country, this road will profit more from it than most others. Its January and February earnings, however, do not indicate that there has been much increase in activity so far.

The Durability of Locomotives.

Last week we printed an extract from the London *Engineer* giving some particulars as to the durability of English locomotives. The average mileage between repairs is given for the leading classes of engines on the Great Western, a line 2,300 miles long which builds all its own engines and aims rather at cheapness of first cost and facility of repairs than durability. Grades steeper than 53 ft. per mile constitute 23 per cent. of the total length of the line, and 2½ per cent. is steeper than 106 ft. per mile. The minerals conveyed in 1884 weighed 18½ million tons, against 5½ million tons of freight. The passenger train mileage nearly equaled that run with freight trains, no allowance for switching, etc., being made in either case.

These particulars give a rough idea of the work to be done by the locomotives, but the durability of engines is largely dependent upon other factors, the average value of which cannot be determined. We refer particularly to the quality of the water and the care taken of their engines by the enginemen. The wear of the tires is generally the cause that renders it necessary to send the engine into the shops. The amount of this wear is to a large extent independent of the sound and faithful workmanship of the engine, and even of the quality of the tires. A careful engineman who applies a little sand before the engine begins to slip, and never uses sand until the wheels have ceased to spin, takes upon himself a great deal of extra work, but will make a poor tire show a splendid mileage, while the man who allows his engine to slip freely and then pours down sand without shutting the throttle will soon grind away the tires and punish his motion.

The mileage between shop repairs is not a wholly satisfactory criterion of the durability of a locomotive. Some master mechanics consider that every engine should go into the shops once during the year to be overhauled and examined, and say that by this method they are kept in a higher state of efficiency than if left to run until repairs are imperatively needed. Others again believe in getting the largest possible mileage out of an engine and letting her run until she is knocking, shaking, blowing and leaking all over. The medium course is proverbially the best in most matters, but the better method with locomotives is probably the first indicated, endeavoring to keep them always in first-rate condition. It has certainly several great advantages. The amount of coal burnt is less, the engine is better able always to haul a full load, the chances of a break-down are lessened, and the damage to the permanent way is diminished. On the other hand, a larger number of locomotives are needed, and as there are more engines in the shop at one time, increased shop room is necessary. Whether the actual total cost of repairs is increased is a mooted point.

The number of break-downs on the road is of course an excellent criterion of the care taken of the engines, both in the round-house and on the road, and is also valuable testimony to the quality of the workmanship, material and design. The figures given by *The Engineer* we confess astonish us. That a line having 1,800 engines should have only 60 break-downs in the course of a year is something of which every one connected with the locomotive may well be proud. As the life of a modern locomotive is barely 15 years, it implies that only one of every two locomotives ever breaks down in the course of its existence. The writer made a voyage once in a steamship, the engineer of which boasted that she had made eight round voyages of 13,000 miles each, and had never had to stop 15 minutes while at sea. The main steam-pipe cracked, however, on this voyage and entailed 23 hours delay. This performance pales before that given for the locomotives of the Midland Railway. The engines of this line possess the characteristic peculiarities of English engines, inside cylinders, small cabs and very careful finish of even the smallest details. The boilers, fire-box and tubes are all smaller than would be considered advisable for the same size of cylinders here.

The Engineer appears to be strongly of opinion that these results are much superior to any attained on this side of the water. That may possibly be so, but as far as our previous knowledge on the subject would guide us, we can only say that an American and an English superintendent each showed us the number of break-downs monthly on their respective systems. In both cases, the majority of the engines were built at the railroad company's shops, and every effort was made to build the engines as cheaply as possible. In both cases, too, the engines were rather lighter for their power than is used in the two countries respectively. The sharper curves, the greater preponderance of freight traffic and some other conditions were all unfavorable to the American engine. The results were therefore the more gratifying. The failures of locomotives on the American road were at the rate of 1 for every 80,000 miles. On the English road the mileage per failure was only about 50,000 miles, about half the failures being due to burst flues. The American line had no failures of this class. It will be observed that these figures differ widely from those given in *The Engineer*.

Some time ago we published a comparative statement of the breakage of coupling-rods on the Pennsylvania and on the Great Western, an English line already referred to. This comparison was greatly in favor of the Pennsylvania. A large number of failures are reported to have occurred to Mr. Webb's compound engines on the London & Northwestern, and though few of these failures are apparently due to the compound system, and therefore do not really form a serious argument against that principle, they show that exceptionally heavy and well-built English locomotives are liable to numerous mishaps on the road. We therefore cannot help thinking that the results obtained on the Midland and London & Brighton are exceptional.

Some explanation of this wonderful immunity from accident may be found in the fact that on both lines

no expense is spared to make a first-rate job, and the engines are kept scrupulously clean. Many a flaw hidden by dirt would be discovered if the defective part showed a bright or perfectly clean surface.

On the Brighton line, the names of the engineer and fireman are painted on the cab, with the dates at which the engine went into and came out of the shops and the mileage between repairs. The engineer and his engine are thus inseparably connected, and the results show that the engineer takes a real personal pride in his engine, and that this system gives exceedingly satisfactory results.

The Bridge Manufacturers' Proposed Specifications.

We give in another column the first part of the form of specification for the quality and workmanship of bridge iron and steel, which the leading bridge manufacturers desire to have American engineers adopt. The movement itself is undoubtedly commendable, being founded upon reason, and, in fact, almost necessary for protection against too frequent arbitrary exactions. It is fully in accord with the spirit of the times, which preëminently favors the organization of class interests and the establishment of standards of practice.

But when one examines the specifications, as amended at the meeting into the form which the manufacturers have agreed upon, one can hardly escape a feeling of disappointment at their recommendations. The evasions of sound and reasonable requirements are too palpable to be overlooked, and the latitude which it is proposed to allow to the manufacturers seems entirely too wide to insure such material as should be used in bridge construction. There is unquestionably a certain force in the plea that cheap material is conducive to the interests of the buyer, which the manufacturers used in their call for Tuesday's convention, but we have yet to hear any complaints that iron bridges are too dear, or that any buyer wishes economy at the cost of good material. We do hear, it is true, a great many complaints that manufacturers do not get price enough for their bridges, and that there is little if any profit in the business—a state of affairs that the shrewd buyer is fully aware of, and of which he naturally and properly takes advantage; but while buyers want the lowest possible prices, they want and should insist upon good material as well, and if prices are too low, the fault as well as the remedy lies with the manufacturer. Fortunately for all concerned they are, on the whole, required to hold up the quality of their material and workmanship, and even at the expense of no little over-strictness and not a few irritating exactions, this is well. There is none of that almost absolute lack of effort on the part of buyers to keep up standards which prevails in railmaking, for example, but in his natural anxiety to get work and keep his shop full, the bridge manufacturer shades his price at every letting, and often weighs his tender by the thousandth of a cent per pound. We heard of one letting recently where work was awarded at 3.189 cents per pound! Now, this is getting down rather fine, and the fortunate (or unfortunate) successful bidder is very naturally disposed to turn around and see where he can shave his material by similarly refined decimals, which he can only do effectually in bridge-building by getting specifications amended, at least if he is to be reasonably sure of having no trouble. Under such a condition of things the manufacturer would be more than human did he not want a latitude of selection and workmanship, which would relieve him of too much deference to engineering authority; for while he may take pride in his work and reputation, there is always the underlying question of dollars and cents, which will naturally assert itself, particularly in times of intense competition, when almost a table of logarithms is required to compute to the decimal extension bills at the prices bid.

While the manufacturing interest seems to be having things rather too much its own way in this matter, still, so far, it has reason and right on its side, and the movement can hardly fail of good results. Some important specifications have still to be acted on.

Just as we go to press, news comes of the death of Gen. John H. Devereux, President of the Cleveland, Columbus, Cincinnati & Indianapolis Railway Company, a railroad man from the age of 16, and since the first year of the war a prominent one, and in the community where he was known—a very wide one—one of the most highly respected and best beloved of men. The good will which he almost universally inspired in others, even on short acquaintance, was really simply the reflection of the good will which he felt toward them; for few men took so warm an interest in the welfare of those about him, of all classes and grades. This made him very popular with the employés of his railroads, which was more than once of great value to him. He was also a very public-spirited man, and sometimes took an active part in politics, and was one of the most prominent laymen in the Episcopal Church.

The Southwestern strike continues to be serious on the Missouri Pacific, where the men had no grievance, there having been scarcely any movement of freight trains, those attempting to take out such trains being usually frightened away from them, though in a few cases violence has been used. On the Texas & Pacific there has been a partial resumption of traffic, and it would appear that it is possible to get men if their safety is assured, and the United States Court is doing something toward that. Some arrests have been made where violence was used, but in very few cases, if any, has any one been disturbed for taking possession of or disabling the railroad property, or obstructing the track or otherwise interfering with the working of the roads—acts for which any one would be arrested if there was no strike. It is the neglect of the local authorities to prevent and punish such illegal acts that has led the men apparently to look upon them as legitimate means of obtaining what they desire. Every such obstruction is virtually robbery, for it takes from the owner of the property all that makes it valuable, which is the right to use it.

The New York Railroad Commission has recommended to the Legislature to pass a law empowering the Commission to investigate disputes between railroad companies and their employés, and providing that its findings and recommendations shall be held *prima facie* just and reasonable in proceedings to be brought at the request of either party by the Attorney-General in the Supreme Court, to have such recommendations "entered as the judgment of said court." We do not understand that the decision of any court in Christendom that any given rate of wages or hours of labor or method of discipline is just and reasonable would compel any one to accept or to give such terms; but we suppose that the purpose of the act is to make the railroad companies do what the Commission should recommend in such cases. The trouble with any such arrangement is that only one party could be bound by it—the railroad companies. No power on earth could make the men work for them if they did not wish to.

The total through shipments from the West to points east of the western termini of the trunk lines were considerably larger in February than in January, though the gain in these was not as large in proportion as the Chicago through shipments, which were 30 per cent. more in February than in January, while the total trunk line shipments eastward were 15 per cent. larger in February.

These latter have been in January and February for six years:

	1880.	1882.	1883.	1884.	1885.	1886.
Jan.	531,238	740,693	853,251	599,019	740,873	648,317
Feb.	572,944	674,568	731,328	524,004	759,022	745,012
2 m's.	1,104,182	1,415,261	1,584,579	1,123,023	1,499,895	1,393,329

The shipments over the Lackawanna and the West Shore roads are included this year, but were not reported before (that is, the east-bound shipments), and these perhaps averaged as much as 125,000 tons a month last year and 80,000 in 1884, but probably not more than 40,000 in 1883, when the West Shore was not open. That January and February were equal to the average we would not say; probably not. Neglecting this, while the January shipments this year were less than in any other year except 1880 and 1884, the February shipments were exceeded only in 1885, and then only by a very small amount. The east-bound movement last month was, indeed, quite satisfactory on the whole.

By the side of these enormous trunk-line shipments eastward other traffic movements (except that in anthracite coal, which is centrifugal, as it were) dwindle into insignificance. In these two months the Chicago through shipments were 384,511 tons, and the St. Louis shipments 42,574—the former 27½ per cent. and the latter 3 per cent. of the total trunk-line shipments. Thus we see that about seven-tenths of the latter must be shipped from other and less important places, which it will be well to bear in mind when the Chicago shipments, which alone receive much attention, are very large or very small. At both these places the shipments have been smaller than usual this year, and at St. Louis they were not half as great as in the corresponding months of last year.

The Strong Valve Gear.

The indicator cards given by the Strong valve gear deserve careful study. The consumption of steam per indicated horse-power as calculated from the cards is about 4 lbs. less than that shown by cards taken on locomotives fitted with ordinary link motion. This saving is very appreciable. It is of course understood that the consumption shown by the indicator diagram differs considerably from the actual consumption, owing to the losses produced by radiation, condensation, and subsequent re-evaporation in the cylinder. While, therefore, the consumption of steam as calculated from the indicator diagram does not show the actual consumption, it affords a fairly accurate means of comparing the relative efficiency of different systems of valve gear. Judged by this method, Mr. Strong's gear appears to give economical results, which are doubtless due to the large port openings, but an additional source of economy is to be found in the manner in which the passage between the valves and cylinder is arranged.

The valves being placed near the ends of the cylinders, the passages are very short, and this not only diminishes the loss from clearance but reduces the loss from condensation. In all engines where a single passage is used for both steam and exhaust, the former on entering the cylinder is chilled by the colder walls of the passage, and the heat so imparted to the ports is in turn absorbed by the exhaust. Mr. Strong's arrangement of valves and passages evidently diminishes this loss.

The more economical consumption of steam and the diminished weight of valve gear and cylinders are undoubted advantages. The whole arrangement, however, possesses more parts than the ordinary arrangement of link motion and slide valve, and it appears that the mechanical design of the valve gear is capable of improvement. At present the strains on many of the principal parts are not direct, but are one sided, and must therefore tend to twist and throw unfair strains on the rods and pins, producing unequal wear on the working parts. Perfection is not, however, attained in a day, and as the gear has been as yet used on only a few engines, a little further experience will doubtless point out a method to still further improve the construction of this gear. Though the wear on the working parts, if properly designed, is not likely to be great, the great size of the valves throws at times a considerable strain on the working parts.

When once the engine is fairly under way, the compression underneath the valves nearly balances the pressure in the steam-chest and the valves can be moved very easily. When, however, the engine starts, there is no compression on making the first stroke, and the valves, being under the full boiler pressure, offer considerable resistance to being moved, and consequently the valve gear should be made strong enough to stand the strain of moving the valves under the unbalanced pressure. As this can only occur when the engine is starting, the *average* strain on the valve gear is comparatively small, and the wear of the parts should be correspondingly reduced.

We shall look forward with much interest to the further and extended tests of this valve gear, which is likely to meet with much favor from those who wish to attain the highest efficiency in express locomotives.

Erie Earnings in January.

The report of the New York, Lake Erie & Western Railroad proper for the month of January last shows smaller gross earnings than in any other January since the re-organization except 1879 and 1885, but larger net earnings than in any of these nine years except 1878 and 1880, and very nearly as great as then. The gross and net earnings and working expenses in January in each of the nine years have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1878	$1,304,018	$959,793	$344,225
1879	1,147,173	960,031	187,142
1880	1,296,381	946,565	349,816
1881	1,443,437	1,138,988	305,449
1882	1,318,996	1,137,214	182,782
1883	1,524,869	1,220,293	304,576
1884	1,272,331	1,098,257	174,074
1885	1,050,474	863,347	187,127
1886	1,254,112	911,127	342,985

Compared with last year the increases are:

	Gross earnings.	Expenses.	Net earnings
Amount	$203,638	$47,780	$155,858
Per cent	19.4	5.2	45.4

The percentage of gain in gross earnings is very large, but it is made so by the extraordinarily small earnings last year, this year's remaining very small notwithstanding the gain. But the working expenses were much less than in any other year except last year, and it is to this that is due the fact that the net earnings are among the largest this road has ever made in January.

It must not be forgotten that the net earnings of this road are always very small in January—never nearly enough to cover the month's proportion of the company's fixed charges—and that the enormous *percentage* of increase (45¼) amounts to only the moderate sum of $155,858. Not that this is unimportant, but less important than the percentage might indicate. In October such a percentage would have been a gain of more than $300,000, and for the whole of the fiscal year $2,187,000. The small gross earnings of the month indicate that traffic was decidedly light; the large net earnings that rates were well maintained. It is true that the working expenses were 72⅝ per cent. of the receipts last January, but last year they were 82.2, and in 1884 83.5 per cent., so if the margin of profit is still small, it is twice as great as it used to be.

The leased New York, Pennsylvania & Ohio road earned in January :

	1884.	1885.	1886.
Gross earnings	$433,046	$389,660	$408,076
Expenses	383,180	281,458	318,169
Net earnings	$50,466	$108,202	$89,907
Rental	138,767	124,691	130,584
Loss	88,301	16,489	40,677

The gross earnings this year were $18,416 (4¾ per cent.) more than last year, but less than in any other year since 1879; and the increase in working expenses was $36,711, or twice the increase in receipts, so that the net earnings were $18,295 less than last year (though $39,441 more than in 1884). The loss on the lease was equal to more than one-ninth of the net earnings of the Erie proper this year, and taking this loss from those earnings, we have as its income for the last three years :

1884.	1885.	1886.
$85,771	$170,638	$302,308

which are to be compared with the full net earnings in years previous to 1884, before the lease. The great increase shown above, nearly 100 per cent. from 1884 to 1885 and 77 per cent. from 1885 to 1886, amounting to $216,537, or 252 per cent., from 1884 to 1886, makes the income nearly the same as the net earnings in 1883 and 1881, and considerably less than in 1880 and 1878, yet makes it considerably above the average of years previous to 1884.

For the four months of the fiscal year ending with January the gross and net earnings and working expenses of the Erie proper have been :

Year.	Gross earnings.	Expenses.	Net earnings.
1877–78	$5,875,437	$3,857,046	$2,018,391
1878–79	5,207,851	3,577,415	1,630,436
1879–80	5,9 4,157	3,950,654	1,973,503
1880–81	6,867,472	4,432,732	2,434,740
1881–82	6,420,540	4,591,114	1,829 425
1882–83	6,854,106	4,707 256	2,146,850
1883–84	6,494 896	4,547,838	1,947,058
1884–85	5,195,871	3,642,831	1,553,040
1885–86	5,954,427	3,854,6 5	2,099,822

Thus the gross earnings for the four months were $758,-556 (14½ per cent.) more than last year, but less than in any other year sin e 1880 ; the working expenses were less than in any other year except 1878-79 and last year, and only $211,774 (6 per cent.) more than last year, leaving the net earnings larger than in any other year except 1881 and 1883, and $546,782 (35 per cent.) more than last year, when they were smallest.

Meanwhile the earnings and expenses of the leased Ohio road for the four months were, in the years since the lease.

	1883 84.	1884-85	1885-86.
Gross earnings	$2 184,781	$1,854,632	$1,975,350
Expenses	1,576,597	1,177.544	1,341,008
Net earnings	$610,274	$677,088	$634,342
Rental	693,770	593,471	632 112
Profit	* 88,496	83,609	2 230

* Loss

The increase in gross earnings over last year is but 6½ per cent., against 14½ per cent. on the Erie proper; the increase in expenses 14 per cent., against 6 per cent. on the Erie, and in net earnings there is a decrease of 6.3 per cent., against an increase of 35 per cent. on the Erie proper.

Adding the profit on the lease, and subtracting the loss, the income of the Erie from its whole system has been :

1883-84.	1884-85.	1885 86.
$1,858,562	$1.636,649	$2,102.052

The gain over last year is $465,403, $293,687 of which was made in the last two of the four months.

These four months include two of the best and two of the worst in the fiscal year. Of the total net earnings of the year, 26½ per cent. was made in these four months in 1881–2, and 29, 36⅞, and 34 per cent. in the three following years, respectively. At the first rate the company's income for the present fiscal year (ending with September) would be $8,085,000, or more than it ever has been, 1881-2 being a year when a very bad condition in the four months grew much better afterwards; by the rate of 1883–84, when the reverse was the case, the income this year would be $5,700,000, which is more than in the last two years, but less than in previous years.

The Chicago & Northwestern's Net Earnings.

The working expenses and net earnings of the Chicago & Northwestern Railway for the first seven months of its fiscal year, which are the last seven months of the calendar year, have been published in the *Commercial and Financial Chronicle*, showing them to have been for the last five years:

Year.	Gross earn.	Expenses.	Net earn.
1881	$15,112,925	$7,021,955	$8,090,970
1882	15,405,940	7,957,586	7,448,354
1883	16,348,171	9,122,363	7,225,804
1884	14,819,445	8,081,349	6,738,096
1885	15,618,448	8,221,837	7,396,611

The *Chronicle* says that though these figures do not come from the company's office, they are nevertheless exact; but we notice that while the gross earnings have been the same in successive years, the net earnings given in a similar statement last year and the year before were $7,424,670 in 1883, against the $7,225,804 now reported, and $6,953,262 for 1884, against $6,738,096 now reported.

It appears from the above that the increases for the seven months in 1885 over 1884 were:

	Gross earnings.	Expenses.	Net earnings.
Amount	$799,003	$140,488	$658,515
Per cent	5.4	1.7	9.8

That the working expenses should have been kept so low last year is remarkable, for the length of road worked was but about 2,800 in 1881, 3,300 in 1882, and 3,600 in 1883, against 3,843 in 1884 and 1885, and the gross and net earnings and working expenses per mile of road have been (approximately):

	1881.	1882.	1883.	1884.	1885.
Gross earn.	$5,398	$4,868	$4,541	$3,856	$4,064
Expenses	2,508	2,411	2,534	2,103	2,139
Net earn.	$2,890	$2,257	$2 007	$1,753	$1,925
P. c. of exp.	46.45	51.85	55.80	54.54	52.60

Thus, though there is a notable improvement over last year gross and net earnings per mile were less in 1885 in these seven months than in any other year.

The fixed charges of the company were greatly affected after May, 1884, by the purchase with stock of the Iowa lines which had previously been leased. The rental paid for these lines paid the interest on their bonds, and a much larger amount which went for dividends on their stock. Only that part of the rental which went for interest remains a fixed charge, and the interest and rentals which had been $5,568,-826 in the fiscal year to May 31, 1882, $5,859,581 in 1882–83, and $6,095,939 in 1883–84, fell to $5,093,101 in 1884–85. Something will be added to this for the new Freeport-La Salle line this year, but not much. On the other hand, to pay the present rate of dividend (6 per cent.) on the stock paid for the Iowa lines requires $875,450.

Of the five remaining months of the fiscal year two have elapsed, showing a slight decrease in gross earnings compared with last year. The other three months were more than usually favorable last year, the working expenses being the smallest for several years and 6¾ per cent. less than in 1884. It is quite possible that the gross earnings will be larger this year than last, though not in March, when they were exceptionally large last year; but if so, there will probably be an increase in expenses, and it is not safe to count upon larger net earnings for the five months than were made last year. But the increase in net earnings already given above is equal to $1.23 per share of stock outstanding, while the dividends paid have been reduced $1 per share.

This statement makes it possible to give this company's earnings and expenses for the *calendar year*, which have been :

Year.	Miles.	Gross earnings.	Expenses	Net earnings.
1882	3,303	$23,977,671	13,431,755	10,545,916
1883	3,644	25,024,066	15,048,884	9,975,182
1884	3,767	23,491 898	14,099,939	9,391 959
1885	3,843	24,301,058	13,936,394	10,366,664

It appears, therefore, that the gross earnings have not varied greatly from year to year, the gain of 4⅛ per cent from 1882 to 1883 being followed by a loss of 6 per cent. from 1883 to 1884, and this by a gain of 3½ per cent. last year, when the gross earnings were but 1¼ per cent. more than in 1882. The working expenses have varied more, increasing 12½ per cent. in 1883, and then decreasing 7 per cent. in 1884 and 1⅛ per cent. more last year, leaving them but 3¾ per cent. more than in 1882. These changes have been so great that while the gross earnings were $1,047,000 more in 1883 than in 1882, the net earnings were $570,000 less; and while from 1883 to 1884 there was a decrease of $1,532,000 in gross, the decrease in net was but $583,000; but last year the result is more like that of 1882—$324,000 more gross and $179,000 less net earnings.

In the large table of January earnings which we published last week perhaps the most striking fact shown was that while there was a large decrease in the aggregate earnings of the 82 roads reporting (5 per cent. in the total and 7¾ per cent. in earnings per mile), compared with last year, and a decrease by six of the seven groups into which the roads are distributed, the Eastern roads—east of Ohio and north of the Potomac—had a very decided increase (6.4 per cent. in total and 5.7 in earnings per mile), thirteen of the 17 roads in the group showing some gain, and the losses of three being insignificant, the Grand Trunk alone having an important loss; while no less than ten gained more than 10 per cent.

This is a gain over a very bad year ; but the fact that there were gains in the East more than anywhere else indicates first, that the Eastern roads have profited most by the restoration of through rates, and, second, that they especially profited by the greater activity in manufacturing industries.

In the group next west, north of the Ohio and east of Chicago and St. Louis, where are the western connections of the trunk lines, which next to the trunk lines themselves profit by the higher through rates, we might expect to find a gain also : but instead we find the large decrease of 8 per cent., these lines having done very poorly for two years previous. It is to be said, however, that among the roads reporting in this group are none of the principal trunk-line connections. There are several that have a considerable share of through traffic, however, and most of these earned less than last year —the Cincinnati, Washington & Baltimore 6.2 per cent., the Ohio & Mississippi 8.7, the Alton & Terre Haute 8.3 per cent., and only the New York, Pennsylvania & Ohio 4.7 per cent. more. However, three-fourths of the entire decrease of the group was by the Wabash, reporting for the same mileage both years, and having a decrease of 22 per cent., its earnings per mile being only $345. Nine out of the 19 roads in this group had gains, and, leaving out the Wabash, the aggregate loss of 18 of them was but $63,300, or only 2½ per cent.

As was to be expected, the most unfavorable showing in January is by the lines west and northwest of Chicago and northwest of St. Paul. Of 18 roads in these two groups only three, the Canadian Pacific, the Marquette & Ontonagon and the Milwaukee, Lake Shore & Western have any increase in earnings, and two of these have a decrease in earnings per mile. The 14 roads west and northwest of Chicago had in the aggregate a decrease of 18½ per cent. in total earnings, and of 24 in earnings per mile. Nearly three-eighths of the great decrease was by the Chicago, Burlington & Quincy, more than 11 per cent. by the Northwestern, its neighbor on the north, and more than 5½ per cent. by the Chicago & Alton, a neighbor on the south. But the large losses by the Northern Pacific, the Manitoba and the St. Paul & Duluth show that business was bad in the northern as well as the southern part of the territory which markets produce and buys goods at Chicago.

The group northwest of St. Louis shows a small decrease, which is wholly due to the Missouri and Kansas roads ; the few Texas roads reporting show large gains.

Eleven of 17 Southern roads report losses, and in the aggregate this group had a decrease of 10¾ per cent.

It thus appears that snow was not the only thing unfavorable to railroad earnings last January, losses being large in many districts where there was no interruption to traffic.

Down to this time we have had reports of February earnings from 60 railroads, whose aggregate was:

	1886.	1885.	Increase.	P. c.
Earnings	$15,853,991	$14,680,652	$1,253,339	8.5

This is a very large gain, and is the more welcome because there was a large loss (6.4 per cent. in the aggregate of 83 roads) in January. The loss in January was largely due to bad weather, and the gain in February was largely due to bad weather last year, though in many cases the February earnings this year compare well with those of years previous to last year, as well as with last year.

Among the more notable changes in the reports published this week is the gain of 14½ per cent. by the Grand Trunk, after three years of almost continual decreases. Its February earnings have been :

1882.	1883.	1884.	1885.	1886.
$1,135,166	$1,286,855	$1,297,247	$999,348	$1,142,823

Thus, though there was a large gain compared with last year, there was a large loss compared with the two previous years, and it was because February was very bad last year that there is any gain this.

More encouraging is the gain of 17 per cent. by the Wabash in the earnings of the 2,361 miles it is working now. It had a loss of 22 per cent. in January, which was one-half more than the February gain.

When we published the Illinois Central earnings last week, those of the Illinois lines and Southern Division were given together, showing a decrease of 3½ per cent. in their aggregate. The separate statement of them shows that there was a decrease of 12½ per cent. on the Southern Division and an increase of 5 per cent. on the Illinois lines. The Southern Division has not done as well as its neighbors, for though the Mobile & Ohio lost 11⅓ per cent., the Louisville & Nashville lost less than 2 per cent., and the Louisville, New Orleans & Texas gained 40 per cent. The latter, however, had but just been opened last year, and, notwithstanding the great gain, it earned but $303 per mile. The amount of its gain was about three-fourths of the loss of the Illinois Central's Southern line. Nearly all the other Southern roads reporting made gains last February, and the Southwestern roads large gains, as 16 per cent. by the Gulf, Colorado & Santa Fe (with a similar increase in mileage, however), 10 per cent. by the Texas & Pacific, and 26 by the Texas & St. Louis. The lines west of St. Louis did much worse, the Fort Scott & Gulf losing 23½ per cent. and the Kansas City & Memphis 33½.

The St. Paul & Manitoba had a gain of 7½ per cent. over last year, and the largest earnings it ever had in February, though only a little more than in 1882, when it had one-third less road.

Philadelphia through shipments to the west in February were 25 per cent. larger this year than last, and larger than ever before, except in 1882. Baltimore shipments, on the other hand, were nearly 12 per cent. less than last year, and less than in any other February for seven years, but its shipments are so small that a large percentage of them makes a small amount. Taking the two ports together, their aggregate shipments this year in February were exceeded only in 1880 and 1882, though they were nearly the same as in 1881 and 1884. They were 11⅜ per cent. more than last year, when they were the smallest ever reported.

The Chicago & Atlantic no longer reports its shipments from Chicago, which makes still more imperfect than before the weekly statement of the through freight shipments thence. The seven railroads which do report shipped 32,632 tons of flour, grain and provisions in the week to March 13 this year, by the incomplete reports, against 58,874 last year, and 41,518 tons in 1884. The total shipments of all classes of freight in the corresponding week for five years were, in tons, by the complete report :

1880.	1881.	1882.	1883.	1884.
67,413	52,968	47,567	69,696	47,135

It is difficult to make an allowance for the Chicago & Atlantic, because its shipments vary greatly, but they are not likely to be very large at any time. In the first week of March it carried 2,137 tons, which was less than usual. With that and the unreported higher class freight the total Chicago shipments last week were probably as much as 48,000 tons, against 77,000 last year, and the quantities above in previous years; that is, the shipments this year were nearly the same as in 1882 and 1884, and less than in the other years.

For seven successive weeks the total Chicago shipments and the percentage taken by each railroad have been :

	Week ending.						
	Jan. 30.	Feb. 6.	Feb. 13.	Feb. 20.	Feb. 27.	Mar. 6.	Mar. 13.
Tons :							
Flour	3,551	5,564	4.366	6,247	4.972	3,966	5,684
Grain	12 344	17,868	22,789	34,851	30,000	34,023	19,086
Provisions	9,351	9,738	9,348	7,048	5,392	7,225	7,262
Total	25,246	33,170	36,503	48,146	40,364	45,214	32,637
Per cent. :							
C. & Grand T.	9.0	8.5	13 1	22.7	21.9	22.2	19.6
Mich. Cen.	12.0	12.1	11.4	11.7	21.2	27.8	16.0
Lake Shore	13.5	13.2	11.4	8.4	9.4	17.6	26.1
Nickel Plate	7.5	11.1	16.7	15.6	16.9	2.7	4.1
Ft. Wayne	21.6	18.9	18.1	16.4	10 5	10.6	11.2
C., St. L. & P.	16.1	13.2	13.1	15.1	9.7	6.1	9.5
Balt & Ohio	11.1	11 3	6.4	4.4	4.0	8 3	13.0
Ch. & Atlantic	9.2	11 7	9.7	5.7	6.4	4.7	....
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Omitting the Chicago & Atlantic, the total shipments in these weeks have been :

Week ending.						
Jan. 30.	Feb. 6.	Feb. 13.	Feb. 20.	Feb. 27.	Mar. 6.	Mar. 13.
22,921	29,416	32,941	45,424	37,796	43,076	32,657

Thus the shipments by the seven reporting roads were smaller last week than in any of the four previous.

The decrease from the previous week was wholly in grain, there being an increase of no less than 43 per cent. in flour, while the decrease in the grain shipment was 40 per cent.

The distribution of the shipments last week is noticeable chiefly for the percentage carried by the Lake Shore, which has been far behind for a long time. What it gained the Michigan Central lost. The Baltimore & Ohio also had an unusually large share last week.

The breadstuff exports in February make a more favorable comparison with last year than those of January, but this is not so much because they were larger in February than in January this year, but because they were much larger in January than in February last year. The wheat exports were 1,040,000 bushels (35 per cent.) more in February than in January this year, and the total breadstuffs value $697,000 (7.4 per cent.) more, but there are no other noticeable changes. For the two months ending with February the breadstuffs exports have been, in bushels:

Year.	Flour.	Wheat.	Corn.	All grain	Value.
1881..	5,869,460	15 870,572	7,139,277	29,458,199	$28,848,452
1882..	4.541,535	12,090,694	4,077,845	21,076,191	23,152,717
1883..	8.271,535	12 671,331	9,475,435	30,763 666	31,608,587
1884..	6,643,175	9,039,722	5,848,200	22,289 478	22,388 414
1885..	9,053,230	15,671,912	7,281,664	32,009,061	30,619,025
1886..	5,235.939	9,076.915	6,140,637	20,445,135	19,51?,246

Thus compared with last year there was this year a decrease in the two months of 43 per cent. in flour, 42 per cent. in wheat, 16 per cent. in corn, 36 per cent. in all grains and flour, and 36½ per cent. in the aggregate value of the breadstuffs exports. The wheat and flour exports together were smaller this year than in any other of the six, the corn exports were larger than in 1882 and 1884, but less than in the other three years; and the total quantity and value were the smallest of the six years. The average value per bushel was nearly the same this year as last (95½ cents for all grains), and only 2¼ per cent. less than in 1881, but was 12¼, 7½, and 4¾ per cent. less than in 1882, 1883 and 1884, respectively.

For the eight months of the fiscal year ending with February the values of breadstuffs exports have been:

Year.		Year.	
1881	$182,428,626	1884	$110,359,840
1882	135,296,632	1885	119,320.132
1883	149,431,143	1886	72,510,978

The decrease from 1885 and 1884 is 34 per cent., from 1883, 51½, and from 1881, 55 per cent.

Grain shipments down the Mississippi practically ceased after December until the last week of February, the total shipments by this route for six weeks being but 41,128 bushels; but they were resumed on a large scale at the close of this period, 625,900 bushels going down in the last week of February and 549,372 in the first week of March, these being 16 per cent. of the total Northwestern grain shipments in both weeks. It has quite commonly been the case that the river shipments were largest about this time—before the opening of lake navigation. In 1884 they began two weeks earlier but they never became very large, rail rates being too low; still in March and April, the two months before navigation opened, they amounted to 1,653,196 bushels—about three days' rail shipments. Last year they began in the first week of March, and just as rail rates went down to 15 cents they became very large for two weeks; but the low rail rates soon stopped them again, and while in March the river shipments were 3,066,768 bushels (less than a week's rail shipments), in April they were only 812,009 bushels, which was less than two days' average rail grain shipments.

The higher rates now maintained makes the river route stand a better chance, and if the shipments continue as they have begun, it will make a considerable figure in the grain business until the lakes open.

The receipts of corn at the Northwestern markets have at last become as large as the last crop gave us reason to expect, those for the first week of March not only being larger than in any corresponding week of previous years, but larger than in any previous winter week except the first week of February last year and the last week of February in 1883. They have, indeed, exceeded very few times in the last three years when navigation was open, the only cases being the last week in August and the first two in September, in 1883.

The Northwestern corn receipts in this first week of March were greater than the aggregate wheat receipts for the seven weeks then ending.

The Department of Agriculture estimates the number of hogs in the United States at the beginning of this year to have been only 2 per cent. more than the year before, while from 1884 to 1885 there had been an increase of 4⅛ per cent. A larger increase was to be expected, considering the good corn crops of the last two years, which have made it possible to keep hogs cheaply and desirable to get something to consume the surplus corn.

The great decrease in Chicago, Burlington & Quincy earnings in January leads us to examine what traffic suffered especially. For four years the earnings from each source have been, in January:

	1883.	1884.	1885	1886.
Passenger	$353.437	$374 408	$321,649	$332,955
Freight	1,203.415	1,178,943	1,527 760	928 076
Other	68,828	94,869	143,075	125,690
Total	$1,625,680	$1,648,220	$1,992,484	$1,386,721

Compared with last year the decrease in freight earnings is nearly $600,000, or 39 per cent., an almost unprecedented decrease. There was a small increase in passenger earnings, but these were unusually small last year in January, and the passenger earnings this year were 11 per cent. less than in 1884 and 6 per cent. less than in 1883. On the other hand, while the mail, express, etc., earnings were 12 per cent. less than last year, they were nevertheless large—32 per cent. more than in 1884 and 82 per cent. more than in 1883.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Eutawville.—Extended from Holly Hill, S. C., north to Connor's, 3 miles.

Northern Pacific.—The *Cascade Division* is extended from Yakima Crossing, Wash. Ter., northwest 26 miles.

Wisconsin Central.—Extended from Burlington, Wis., southward 6 miles.

This is a total of 35 miles on 3 lines, making in all 248 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.		Miles.
1886	248	1881	501	1876	302
1885	154	1880	753	1875	120
1884	311	1879	241	1874	198
1883	394	1878	150	1873	348
1882	1,001	1877	127	1872	581

These figures include *main track only*, second tracks and sidings not being counted.

NEW PUBLICATIONS.

The Cost of Manufactures, and the Adminstration of Workshops. By Captain Henry Metcalfe, U. S. A. Published by John Wiley & Sons, New York.

This is a very painstaking and thorough exposition of a new method of keeping the cost of each individual job executed in a large manufactory. This subject has seldom been treated in print, and being of great importance, the book deserves the careful attention of those in charge of large establishments where a great variety of work is executed, and where consequently it is impossible to ascertain the real cost of each item in detail, unless the accounts are kept with great accuracy and on a correct principle. The author gives numerous examples of his method, as applied to the work of government arsenals; but by changing the names of parts, literally beating swords into plowshares, and converting bayonets into locomotive piston-rod cotters, the methods proposed by the author are quite applicable to railroad or other large workshops. We understand that the Dickson Manufacturing Company, of Scranton, is about to try Captain Metcalfe's system of card accounts, which is a sufficient testimony to the practical character of his work.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, at the office in Topeka, Kan., April 15.

Chicago & Alton, annual meeting, at the office in Chicago, April 5.

New York Central & Hudson River, annual meeting, at the office in Albany, N. Y., April 21.

Pennsylvania Railroad, annual election, at the office in Philadelphia, March 23.

St. Louis & San Francisco, special meeting, at the office in St. Louis, May 12, to vote on the lease of the Kansas City & Southwestern road.

Union Pacific, annual meeting, at the Meionaon in Boston, at 10 a. m., on March 31.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Milwaukee & St. Paul, 3½ per cent., semi-annual, on the preferred stock, and 2½ per cent., semi-annual, on the common stock, both payable April 15, to stockholders of record on March 25.

Freehold & Jamesburg Agricultural (leased to Pennsylvania Railroad Co.), 8 per cent., yearly, payable on demand, to stockholders of record on March 15.

New York Central & Hudson River, 1 per cent., quarterly, payable April 15, to stockholders of record on March 15.

New York, Lackawanna & Western (leased to Delaware, Lackawanna & Western), 1¼ per cent., quarterly, payable April 1.

Raleigh & Gaston, 2 per cent., semi-annual, payable April 1, to stockholders of record on March 13.

Sunbury & Lewistown (leased to Pennsylvania Railroad Co.), 3 per cent., semi-annual, payable April 1.

Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The *Southern Time Convention* will hold its spring meeting at the Grand Hotel in Cincinnati, on Wednesday, April 14.

The *General Time Convention* will hold its spring meeting at the Grand Hotel in Cincinnati, on Wednesday, April 14.

The *Association of American Railroad Superintendents* will hold its next meeting in Cincinnati on Thursday, April 15.

The *American Society of Mechanical Engineers* will hold its next meeting in Chicago, on Tuesday, May 25.

The *Master Car-Builders' Club* will hold its regular monthly meetings through the winter at the rooms, No. 113 Liberty street, New York, on the evening of the third Thursday in each month.

The *New England Railroad Club* will hold its monthly meetings at its rooms in the Boston & Albany passenger station in Boston, on the evening of the second Wednesday in each month.

The Western Railway Club will hold its regular monthly meetings at its rooms, No. 103 Adams street in Chicago, on the third Wednesday in each month.

Foreclosure Sales.

The *Wabash, St. Louis & Pacific* road will be sold under foreclosure sale by Edmund T. Allen, Commissioner, on April 26 next, at the United States Court House, in St. Louis. The sale will include the main line from Toledo to East St. Louis, with branches to Hannibal, Camp Point and Hamilton, east of the Mississippi, and west of the Mississippi the line from St. Louis to Kansas City, with the branches to Moberly and Glasgow, and that portion of the Clarinda branch in the state of Missouri. Besides these lines the sale will include the line known as the Peoria, Pekin & Jacksonville, the Springfield & Northwestern, the Braidwood Branch, the Madison County Branch, the Detroit, Butler & St. Louis, the Chicago & Paducah, the Chicago & Strawn, and that portion of the Council Bluffs & St. Louis road which is in Missouri. Also the right to use the track and terminal facilities in Chicago, Peoria, Kansas City, Hannibal, St. Joseph and Detroit, with other leases and terminal tracks, and also leasehold interests in the Boone County & Booneville, the St. Louis, Ottumwa & Cedar Rapids, the St. Joseph & St. Louis, the Brunswick & Chillicothe, the St. Louis, Council Bluffs & Omaha, the Council Bluffs & St. Louis, in Iowa, the St. Louis & Des Moines, the Eel River road, the Humeston & Shenandoah, the Clarinda & St. Louis, the St. Louis, Jerseyville & Springfield, the Attica, Covington & Southern, the Champaign & Southeastern, the St. Louis bridge and the Hannibal bridge. The sale will further include a large amount in securities of leased and controlled lines owned by the company, and the interest in 4 steamers employed on Lake Erie, and in general all other property owned by the company and covered by the consolidated mortgage. The branches in the company has only a lease held on conditional title may be sold separately from the other property, if requests for such separate sale be made by the holders of a majority of the general mortgage bonds. Unless such requests be made the Commissioner will first offer for sale all the right, title and interest of the Wabash Co. in such line with the other property. Having, subject to the approval of the Court, accepted the highest bid received for the property covered by the mortgage, if sold as a whole, or the highest bid therefor if sold separately by request, the Commissioner will next offer for sale the property embraced in the collateral trust mortgage, including first the bonds and stocks, second the equipment, third the lake steamers, and fourth the real estate and terminal interests in Chicago, and will note the highest bid received for each lot separately, and will then offer all of said property for sale together and accept, subject to the approval of the Court, the highest bid received. The conditions of the sale are that the bidder shall be required to deposit with the Commissioner 10 per cent. in cash of the whole amount of his bid, the deposit to be returned in case the sale is not approved by the Court. Should the sale be approved, the purchaser will be required to pay in cash such additional amount as the Court may direct, the balance to be payable either in cash or in bonds at their *pro rata* value, as fixed by the Court. The Court will retain jurisdiction of the property and the purchaser of the property until all claims and demands shall have been paid under its direction.

The *Denver & New Orleans* road will be sold in Denver, Col., March 18, under a decree of foreclosure granted by the United States Circuit Court at the suit of the Mercantile Trust Co., of New York, trustee under the first mortgage. The road extends from Denver, Col., to Pueblo, 125 miles, with 13 miles of branches. It was intended to run to the Texas line, there to make connection with the road From Ft. Worth, but construction was supended several years ago. By the late statement there were outstanding $2,469,000 first-mortgage bonds and $2,740,900 in stock. A company known as the Denver, Texas & Gulf was recently organized to complete the road, but has so far done nothing toward it.

ELECTIONS AND APPOINTMENTS.

Annapolis & Baltimore Short Line.—The officers of this company are: President and Treasurer, H. P. Underhill, Baltimore; Vice-President, J. S. Ricker, Portland, Me.; Secretary, Henry W. Rogers, Baltimore.

Central Missouri.—The following are the directors of this company, which proposes to build from East St. Louis to Kansas City: Geo. I. Post, Fair Haven, N. Y.; J. T. K. Hayward, L. C. Nelson, John W. Harrison, St. Louis; Henry G. McPike, Henry R. Phinney, Alton, Ill.; Edward H. Allen, Thomas B. Bullene, Edward L. Martin, Kansas City, Mo.; John H. Garth, James T. Barber, Hannibal, Mo.; Wm. M. Eiy, Perry, Mo. The officers are: George I. Post, President; J. T. K. Hayward, Vice-President and Chief Engineer; L. C. Nelson, Secretary and Treasurer.

Central Passenger Committee.—The office of Commissioner George H. Daniels was, on March 8, removed from Cincinnati to No. 205 La Salle street, in Chicago, where it will remain hereafter.

Cheyenne & Northern.—The directors of this new company are: Joseph M. Carey, Philip Dater, Henry G. Hay, Wm. C. Irvine, Erasmus Nagle, Morton E. Post, Francis E. Warren. Office at Cheyenne, Wyoming.

Chicago, St. Louis & Pittsburgh.—At the annual meeting in Indianapolis, March 17, the following directors were chosen for five years: Wm. L. Scott, Erie, Pa.; Edmund Smith, Philadelphia.

Cleveland, Columbus, Cincinnati & Indianapolis.—As of March 1, 1886, the title of Mr. W. C. Irwin is changed from General Roadmaster to Chief Engineer and General Roadmaster.

East Tennessee, Virginia & Georgia.—Mr. C. A. De Saussure has been appointed Assistant General Passenger Agent, with office in Memphis, Tenn., and will have charge of the local business of the Memphis & Charleston Division.

Eutawville.—Mr. H. T. Peake is Chief Engineer of this road. He has his office in Charleston, South Carolina.

Montana & Idaho.—The directors are: A. Hammond, S. T. Hauser, W. J. McCormick, W. C. Murphy, G. A. Wolf, Frank H. Woody, Frank L. Worden. Office at Salmon City, Idaho.

New England Railroad Club.—The following officers have been elected for the ensuing year: President, J. W. Marden; Vice-President, J. N. Lauder; Secretary and Treasurer, J. M. Ford; Executive Committee, J. W. Marden, J. N. Lauder, F. D. Adams, O. Steward, D. C. Richardson, John Kent, C. J. Post, F. C. Mosely and G. H. Billings; Finance Committee, S. D. Nye, F. M. Curtis, Osgood Bradley, T. W. Getman, George Buntin, H. L. Leach, F. S. Sherburne, G. W. Peck and C. W. Sherburne.

Pensacola & Memphis.—The directors of this new company are: Wm. McLean, Grenada, Miss.; B. D. Cameron, John D. McInnis, J. P. Walker, E. Watkins, J. H. Wright, Meridian, Miss.; S. C. Cobb, L. H. Sellars, Walter Tate, S. N. Von Praag, Wm. B. Wright, Pensacola, Florida.

Peoria & Pekin Union.—This company last week elected directors as follows: O. D. Ashley, Henry Graves, Solon Humphreys, Nelson Robinson.

Philadelphia, Marlton & Medford.—This company, whose road is operated by the Camden & Atlantic Co., last week elected Wm. L. Elkins, President; D. M. Zimmerman, Secretary; Wm. Taylor, Treasurer.

Pittsburgh, Cincinnati & St. Louis.—At the annual meeting in Columbus, March 16, the following directors were

chosen: David S. Gray, Columbus, O.; G. W. McCook, Robert Sherrard, Steubenville, O.; J. N. McCullough, Thomas D. Messler, Wm. Thaw, Pittsburgh, Pa.; W. H. Barnes, J. N. DuBarry, John P. Green, H. H. Houston, Wistar Morris, George B. Roberts, J. P. Wetherill, Philadelphia.

St. Louis & Hannibal.—This company has re-elected John I. Blair President; S. S. Palmer, Secretary and Treasurer.

St. Louis, Iron Mountain & Southern.—The directors chosen last week by this company (which is owned by the Missouri Pacific) were: George W. Allen, George J. Gould, Jay Gould, R. S. Hayes, H. M. Hoxie, A. L. Hopkins, R. C. Kerens, R. J. Lackland, Duncan D. Parmely, Russell Sage, Samuel Shethar, John T. Terry and Henry Whelen.

San Antonio & Aransas Pass.—Mr. P. J. Milan is appointed Master Mechanic, with office in San Antonio, Texas.

Savannah, Florida & Western.—At the annual meeting in Savannah, Ga., recently, the following directors were chosen: W. S. Chisholm, J. H. Estill, H. S. Haines, Savannah; M. K. Jesup, M. J. O'Brien, H. B. Plant, Henry Sanford, New York. The board re-elected H. B. Plant President; W. S. Chisholm, Vice-President; H. S. Haines, General Manager; Wm. P. Hardee, Secretary and Treasurer.

Shell Beach.—At the annual meeting in New Orleans, recently, the following directors were chosen: Lloyd R. Coleman, John R. Elder, Wm. L. Elder, Lucas E. Moore, Joseph A. Shakespeare, M. R. Spelman, B. S. Story. The board elected John R. Elder President; Lloyd R. Coleman, Vice-President; M. R. Spelman, Secretary and General Superintendent; Lucas E. Moore, Treasurer; E. D. White, Attorney.

South Carolina.—At the annual meeting in Charleston recently the following directors were chosen: W. H. Brawley, Andrew Simonds, Charleston, S. C.; G. W. Dillaway, James J. Higginson, Gustav Kissell, T. Bailey Myers, Percy R. Pyne, Henry Sampson, Samuel Sloan, F. A. Stout, Henry P. Talmadge, New York. The board re-elected Henry P. Talmadge, President; James J. Higginson, Vice-President.

South Florida.—At the annual meeting in Sanford, Fla., March 10, the following officers were elected: President James E. Ingraham, Sanford, Fla.; Vice-President, R. M. Pulsifer, Boston; Directors, W. S. Chisholm, H. S. Haines, Savannah, Ga.; B. F. Newcomer, Baltimore; E. B. Haskell, Boston; H. B. Plant, New York.

Willmar & Sioux Falls.—The directors of this new company are: G. H. Perkins, J. M. Spicer, Willmar, Minn.; Gorham Powers, Granite Falls, Minn.; J. G. Schultz, C. B. Tyler, Marshall, Minn.; C. C. Goodnow, D. E. Sweet, Pipestone, Minn.; H. L. Carson, E. A. Sherman, Sioux Falls, Dakota.

Winnipeg & Hudson's Bay.—At a meeting held in Winnipeg, Manitoba, recently, the following officers were chosen: President, Hugh Sutherland; Directors, D. J. Beaton, C. S. Drummond, C. J. Hoare, Joseph Mulholland, S. J. Smith, H. S. Westbrook; Secretary, D. J. Beaton.

PERSONAL.

—Mr. C. A. Coombs has resigned his office as Superintendent of the Knox & Lincoln Railroad, to accept a position on the Boston, Hoosac Tunnel & Western.

—Mr. H. L. Morrill has resigned his position as General Manager of the Boston, Hoosac Tunnel & Western road, to take effect April 1. It is understood that Mr. Morrill intends going to a western road.

—Mr. John A. Oberly, who has just been nominated by the President as a Civil Service Commissioner, some years ago served one term very acceptably as a member of the Railroad and Warehouse Commission of Illinois.

—Mr. Joseph D. Parsons, a well-known paper manufacturer, died in Holyoke, Mass., March 12, aged 72 years. He was for a number of years a director of the Holyoke & Westfield Railroad Co., and served for a time as President.

—Mr. Andrew Atkins, widely known as a traveling passenger agent for a number of years past, died March 10 in San Antonio, Tex., of disease of the heart. For some years past he has been in the service of the Baltimore & Ohio.

—Mr. Frank M. Wilder, formerly Superintendent of Motive Power of the New York, Lake Erie & Western has severed his connection with Mr. Geo. H. Corliss, of Providence, R. I. Mr. Wilder has been with the Corliss Works since he left the Erie road.

—Mr. A. W. Hawley, formerly Master Mechanic of the New York, New Haven & Hartford road, died at his residence in New York, March 12. Mr. Hawley had been connected with the road for 38 years, and was engineer in charge of the engine which ran the first passenger train through from New York to New Haven.

—Mr. Stephen Little, who for nearly 12 years has been at the head of the accounting department of the New York, Lake Erie & Western Railroad, first as Auditor and for the last three years with the title of Comptroller, has resigned that office to accept a position with the firm of Fowler Brothers, one of the great Chicago packing and provision firms, with branches in New York and Bristol, England. Mr. Little came to the Erie near the close of the Watson administration to make some special investigations, and was appointed Auditor by Mr. Jewett, in July, 1874, very near the beginning of his administration. He came to New York from Baltimore, where he had been Auditor of the Northern Central Railway, and at an earlier date he was in the accounting department of the Pittsburgh, Fort Wayne & Chicago, and at one time business manager of the Presbyterian *Banner* in Pittsburgh. He is one of the most capable railroad accountants in the country, and a man of great firmness of purpose and integrity of character. His residence henceforth will be in Chicago.

TRAFFIC AND EARNINGS.

Northwestern Traffic Association.

The business done in this Association for February was as follows:

	West-bound. Tons.	West-bound. Rev.	East-bound. Tons.	East-bound. Rev.	Wheat milled locally. Tons.	Wheat milled locally. Rev.
Chi., M. & St. P.	5,040	$30,800	1,122	$4,556	1,047	$2,427
Chi. & Northwest.	5,592	30,816	...	.....	.....	.....
Chi., R. I. & P	6,016	31,308	...	.....	.....	.....
Chi., B. & Q.	4,628	17,064	...	.....	.....	.....
Chi., St. P., M. & O.	.....	.....	2,713	8,397	275	632
Minn. & St. L.	.....	.....	1,829	6,041	148	346
Rock I. & Peoria	286	1,114	.....	.....	.....	.....
Total	22,462	$111,102	5,664	$18,994	1,470	$3,405

West-bound traffic showed an increase over last year of $29,808, or 37.2 per cent.; east-bound a decrease of $9,578, or 33.2 per cent.

Tobacco Rates.

The following rates are announced on unmanufactured tobacco from the points named to New York: St. Louis, Quincy and Keokuk, 43; Cairo, 43; Evansville and Rock port, 40; Chicago, 38; Louisville, 36; Indianapolis, 34; Cincinnati, 32 cents per 100 pounds.

Cotton.

Cotton movement for the week ending March 12 is reported as follows, in bales:

Interior markets:	1886.	1885.	Inc. or Dec.	P. c.
Receipts	34,312	21,380	I. 12,932	60.5
Shipments	54,984	39,427	I. 15,557	39.5
Stock, March 12	421,736	181,132	I. 240,604	132.9
Seaports:				
Receipts	62,129	42,581	I. 19,548	45 9
Exports	106,192	68,857	I. 37,335	54.1
Stock, March 12	930,901	736,103	I. 193,798	26.3

The total movement from plantations for the crop year to March 12 is estimated at 5,897,451 bales, against 5,335,180 last year, 5,272,252 in 1883-84, and 6,144,965 in 1881-82.

Southwestern Railway Association.

Commissioner Midgley has completed the following statement of the business done in this Association for the year ending Dec. 31, 1885:

Roads.	East bound. Tons.	East bound. Revenue.	West bound. Tons.	West bound. Revenue.	Total revenue.
C. & A.	298,411	$1,248,595	143,267	$793,718	$2,042,314
C., B. & Q.—					
Quincy Line	127,587	599,047	107,773	623,408	1,222,455
Hopkins Line	50,747	199,957	41,064	311,894	511,884
C., R. I. & P.	104,748	474,107	122,890	741,584	1,215,691
W., St. Louis & P.	278,577	1,172,862	150,520	826,640	6,999,5 3
M. & P.	231,981	733,560	134,111	668,147	1,401,707
H. & St. Joe.	13,772	50,323	18,319	86,795	117,118
C., B., Q., B. & M.	135,113	322,601	7,241	46,117	368,808
M. P. Jct. Pts.	16,007	54,777	23,625	120,198	174,975
M.C.& Neb. Ex. Pts.	31,739	106,015	6,449	36,697	142,712
Totals	1,288,712	$4,961,969	755,212	$4,255,198	$9,217,167

The total revenue in 1884 was $10,999,884, showing a decrease last year of $1,782,717, or 16.2 per cent.

Central Iowa Association.

The earnings of the lines in the Central Iowa Traffic Association for the month of February were as follows:

Roads.	West-bound Tons.	West-bound Revenue.	East-bound. Tons.	East-bound. Revenue.
C., R. I. & P.	1,517	$10,842	101	$829
C. & N. W.	534	3,492	39	251
C., B. & Q.	746	4,847	125	785
C., M. & St. Paul	517	3,263	25	96
W., St. L. & P.	636	4,227	9	84
Total	3,950	$26,672	299	$2,045

West-bound business shows an increase in February, 1885, of $3,649, or 15.9 per cent.; east-bound a decrease of $699, or 25.9 per cent.

Coal.

Coal tonnages for the week ending March 6 are reported as follows:

	1886.	1885.	Inc or Dec.	P.c.
Anthracite	541,720	578,726	D. 37,006	6 6
Eastern bituminous	209,735	205,286	I. 4,449	2.2
Coke	59,234	48,370	I. 10,860	22.4

The strike of the bituminous coal miners has become general, affecting the Cumberland, Broad Top, Clearfield and several minor districts. Some of the operators have expected it and have a considerable stock on hand, but others are unable to fill their contracts or are delayed and embarrassed by the stoppage of mining. A possible result, should the strike continue long, is a short coal supply on the railroads.

Chicago receipts for the two months to Feb. 28 were:

	1886.	1885.	Inc. or Dec.	P. c.
Anthracite	125,451	101,710	I. 23,741	23.3
Bituminous	456,680	493,104	D. 36,424	7.4
Coke	63,974	79,448	D. 15,474	19.4
Total	646,105	674,262	D. 28,157	4.2

Of the bituminous coal this year 141,872 tons were from Eastern mines, 113,228 tons from Indiana and 201,580 tons from Illinois.

The coal output of the Rocky Mountain region for 1885 is estimated as follows:

Montana	86,415
Wyoming	807,328
Colorado	1,356,062
New Mexico	304,016
Total	2,553,821

Colorado is the largest producer, chiefly because its mines are older and better developed than those of Montana and New Mexico.

Pennsylvania Railroad coal tonnage for the week ending March 6 was:

	Coal.	Coke.	Total.	1885.
Line of road	152,252	58,172	210,424	206,808
From other lines	76,804	1,062	77,866	60,844
Total	229,056	59,234	288,290	267,652
Year to March 6	2,165,235	393,237	2,558,472	2,193,268

Increase for the week, 20,638 tons, or 7.7 per cent.; increase for the year, 365,204 tons, or 16.7 per cent.

Pennsylvania Railroad coal tonnage for the week ending March 13 was:

	Coal.	Coke.	Total.	1885.
Line of road	138,671	57,762	196,433	201,071
From other lines	95,766	4,285	100,051	88,795
Total	234,437	62,047	296,484	289,866
Year to March 13	2,399,672	455,284	2,854,956	2,483,134

Increase for the week, 6,618 tons, or 2.2 per cent.; increase for the year, 371,824 tons, or 15.4 per cent.

Anthracite Coal Tonnage.

The statement of anthracite coal tonnage for February and the two months ending Feb. 28, as prepared by Mr. John H. Jones, the Official Accountant, is as follows, the statement including the entire production of anthracite coal, excepting that consumed by employés and for steam and heating purposes about the mines:

	February. 1886.	February. 1885.	Two months. 1886.	Two months. 1885.
Philadelphia & Reading	755,726	655,452	1,455,900	1,257,422
Lehigh Valley	480,736	279,743	927,233	620,488
Del., Lack. & West.	418,299	309,901	915,059	548,321
Del. & Hud. Canal Co.	319,053	167,949	632,139	332,946
Pennsylvania Railroad	267,076	220,265	499,598	428,864
Pennsylvania Coal Co.	77,348	91,373	160,934	155,377
N. Y., L. E. & W.	66,790	43,025	132,437	66,093
Total	2,385,028	1,767,708	4,723,300	3,409,511

Increase for the month, 617,320 tons, or 35 per cent.; for the year, 1,313,789 tons, or 38.5 per cent.

The division of the tonnage for the two months was as follows:

	1886.	1885.	1884.
Philadelphia & Reading	30.8	36.9	35.5
Lehigh Valley	19.6	18.2	20.8
Delaware, Lackawanna & Western	19.4	16.1	17.2
Delaware & Hudson Canal Co.	13.4	9.7	10.4
Pennsylvania Railroad Co.	10.6	12.6	11.0
Pennsylvania Coal Co.	3.4	4.6	4.4
New York, Lake Erie & Western	2.8	1.9	1.2
Total	100.0	100.0	100.0

The stock of coal on hand at tidewater shipping points, Feb. 27, was 996,946 tons; on Jan. 31, 779,004 tons; increase, 217,942 tons, or 28 per cent. during the month.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Two months to Feb. 28:	1886.	1885.	Inc. or Dec.	P.c.
Boston, Hoosac Tun. & W.	$80,674	$55,065	I. $25,609	46.6
Bur., C. R. & No.	385,100	426,256	D. 41,156	9.7
Char., Col. & A.	149,908	161,587	D. 11,679	7.2
Cin., W. & Balt.	289,145	305,186	D. 16,041	5.3
Cleve., Ak. & Col.	66,924	63,791	I. 3,133	4.9
Col. & Greenville	133,014	142,654	D. 9,640	6.9
Col., Hocking Vy. & Tol.	327,325	325,257	I. 2,068	0.6
Den. & R. G. W.	127,664	129,656	D. 1,992	1.5
Grand Trunk.	2,154,460	2,112,969	I. 41,491	1.9
Gulf, Col. & S. F.	293,728	178,005	I. 115,723	65.0
Ill Central:				
Ill. lines	931,099	964,474	D. 33,375	3.5
South. Div.	673 901	820,198	D. 146 297	17.9
Iowa lines.	209,300	205,746	I. 3,554	1.7
Ind., Bloom. & W.	375,018	336,062	I. 38,956	11.6
Ind., Dec. & Spr.	67,997	59,888	I. 8,109	13.5
K. C., Clinton & Springfield	28,307	.....	.....	....
K. C., Ft. S. & G.	325,010	432,094	D. 107,084	24.8
K. C., Spr. & M.	186,336	303,574	D. 117,238	38.5
L., N. O. & Tex.	297,568	197,740	I. 99,828	50.4
Marq., H. & O.	47,918	38,419	I. 9,599	25 0
N. Y., Ont. & W.	161,935	201,058	D. 39,123	19.5
Ohio Southern.	88,769	88,650	I. 119	0.1
Rich. & Dan.	628,927	635,543	D. 6,616	1.0
St. Jo. & Gd. I.	164,960	169,562	D. 4,602	2.7
St. L., A. & T. H.:				
Main Line	178,949	197,057	D. 18,108	9.2
Belleville Line.	120,029	131,300	D. 11,271	8.6
St. P., M. & Man.	834,176	857,342	D. 23,166	2.7
South Carolina.	214,429	241,106	D 26,677	11.1
Texas & Pacific.	861,773	736,073	I. 125,700	17.1
Texas & St. L.	210,426	148,515	I. 61,911	43.0
Va. Midland.	191,632	203 909	D. 12 277	6 0
Wab., St. L. & P.	1,868,830	1,952,564	D. 83,734	4.3
Western N. C.	76,111	66,881	I. 9,230	13.8
Wisconsin Cent.	186,911	195,291	D. 8,380	4.3
Month of January:				
Balt. & Potomac.	$101,091	$98,472	I. $2,619	2.7
Net earnings	38,026	30,029	I. 7,997	26.6
Canadian Pac.	500,358	423,764	I. 76,594	18.1
Net earnings	46,381	84,705	D. 38,324	45.1
Ches. & Ohio.	261,168	229,910	D. 31,742	10.8
Net earnings	61,675	77,977	D. 16,302	20.9
Ches., O. & S. W.	117,285	115,518	I. 1,747	1.5
Net earnings	31,080	25,905	I. 5,175	19.9
Den. & R. G. W.	66,584	67,041	D. 467	0.7
Net earnings	22,595	*865	I. 23,460	...
Des. M. & Ft. D.	19,394	25,311	D. 5,917	23.6
Net earnings	*641	4,450	D. 5,091	...
Eliz., Lex. & B. S.	59,278	55,641	I. 3,637	6.6
Net earnings	14,307	14,504	D. 197	1.3
Gal., H. & S. An.	199,346	211,096	D. 11,750	5.6
Net earnings	29,507	87,344	D. 57,837	66.5
Gulf., W. T. & P.	6,648	.....	.....	...
Net earnings	1,210	.....	.....	...
L. Rock & Ft. S.	43,920	52,965	D. 9,045	17.1
L. R., M. R. & T.	30,022	33,642	D. 3,620	10.8
Louisiana West.	51,320	39,828	I. 11,492	28.7
Net earnings	25,226	19,007	I. 6,219	32.7
L., N. O. & Tex.	159,748	99,297	I. 60,451	60.6
Net earnings	36,276	9,305	I. 26,971	290.0
Mem. & Charles.	115,167	141,306	D. 26,199	18.5
Net earnings	31,352	*21,694	I. 53,046	...
Morgan's La. & T.	383,228	346,863	I. 36,365	10.5
Net earnings	125,191	119,436	I. 5,755	4.5
N. Y., Texas & Mex	11,730	.....	.....	....
Net earnings	1,028	.....	.....	....
South Carolina.	94,375	119,612	D. 25,237	21.0
Tex. & N. Ori'ns.	82,702	65,074	I. 17,628	27.1
Net earnings	38,395	23,708	I. 14,687	61.2
Month of February:				
Boston, Hoosac Tun & W.	$42,318	$22,843	I. $19,475	84.7
Bur., C. R. & No.	207,547	202,537	I. 5,010	2.5
Char., Col. & A.	86,409	81,093	I. 5,307	6.5
Cin., W. & Balt.	144,623	150,402	D. 5,779	3 8
Cleve., Ak. & C.	34,286	32,000	I. 2,286	7.0
Col. & Greenville.	79,300	70,311	I. 8,989	12.8
Col., Hocking Vy. & Tol.	156,954	158,419	D. 1,465	0.9
Den. & R. G. W.	61,080	62,615	D. 1,535	2.4
Grand Trunk.	1,142,823	999,348	I. 143,475	14.4
Gulf, Col. & S. F.	141,535	85,708	I. 56,827	66.1
Illinois Central:				
Ill. lines	478,383	455,867	I. 22,516	5.0
South. Div.	360,917	412,848	D. 51,931	12.5
Iowa lines.	121,000	102,143	I. 18,857	18.5
Ind., Bloom. & W.	196.256	166,290	I. 29,966	18.1
Ind., Dec. & Spr.	31,998	29,401	I. 2,597	8.9
K. C., Clinton & Spr.	15,526	.....	.....	....
K. C., Ft. S. & G.	161,606	211,485	D. 49.879	23.5
K. C., Spr. & M.	101,590	153,520	D. 51,930	33.6
L., N. O. & Tex.	137,820	98,443	I. 39,377	40.0
Marq., H. & Ont.	26,369	22,648	I. 3,751	16.3
N. Y., Ont. & W.	78,979	117.705	D. 38,726	32.8
Ohio Southern.	43,979	43,541	I. 428	1.0
Rich. & Dan.	350,400	309,890	I. 40,510	13.1
St. Jo. & Gd. I.	112,218	82,796	I. 29,422	35.4
St. L., A. & T. H.:				
Main Line	89,693	99,790	D. 10,097	10.1
Belleville Line.	60,989	73,038	D. 12,049	16.5
St. P., M. & Man.	425,000	395,217	I. 29,783	7.4
South Carolina.	120,054	121,494	D. 1,440	1.2
Texas & Pacific.	432,773	394,073	I. 38,700	9.9
Texas & St. L.	107,031	84,616	I. 22,415	26.2
Va. Midland.	99,588	97,905	I. 1,683	1.7
Wab., St. L. & P.	1,054,584	899,245	I. 155.339	17.3
Western N. C.	41,922	33,016	I. 8,906	27.0
Wisconsin Cent.	96,250	93,632	I. 2,618	2.8
First week in March:				
Buff., R. & Pitts.	$23,196	$21,574	I. $1,622	7.5
Chi. & Alton.	155,161	168,442	D. 15,281	7.3
Chi. & East. Ill.	38,935	36,139	I. 2,796	7.8
Chi., Mil. & St. P.	444,000	429,907	I. 14,093	3.3
Chi. & Nor'west.	410.500	426,100	D. 15,600	3.7
Ch., St. P., M. & O.	98,900	89,600	I. 9,300	10.3
C., I., St. L. & C.	53,955	49,240	I. 4,715	9.6
Det., Lan. & No.	18,688	18,314	I. 372	2.0
Illinois Central.	197,800	233,464	D. 35,664	15.3
Iowa lines.	35 900	36,001	D. 101	0.3
Long Island.	44,447	46,285	D. 1,848	4.0
Louis. & Nash.	271,205	300,230	D. 29,025	9.7
Mil., L. S. & W.	28,790	20,415	I. 8,375	41.0
Mil. & Northern.	11,045	10,371	I. 674	6.5
Norfolk & West.	50,039	47,633	I. 2,406	5.0
St. L. & San F.	85,438	80,863	I. 4,575	5.7

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Lake Superior Iron Ore.

The Cleveland *Iron Trade Review* gives the total receipts of Lake Superior iron ore for 1885 at Lake Erie ports at 1,719,180 tons, against 1,841,877 in 1884. The ports reporting heaviest receipts were: Cleveland, 789,899; Ashtabula, 582,000; Sandusky, 143,180; Erie, 132,223.

Rail shipments from the ports were 1,863,506 tons, thus

including 144,326 tons from the previous year's stock. The shipments to the furnaces in the various iron-making districts were: Allegheny County, Pa., and miscellaneous, 919,412; Shenango Valley, 309,865; Mahoning Valley, 318,600; Eastern Ohio, 231,329; West Virginia, 84,800; total, 1,863,506 tons.

St. Louis East-Bound Traffic.

The following is the exhibit of the traffic moved east from East St. Louis in February:

	Dead freight.		Live stock.	
	Tons	P. c.	Tons.	P. c.
C. & A	3,655	17.9	2,698	25.0
Wabash	3,950	19.3	948	8.8
I. & St. L	3,748	18 4	3,794	35.3
Vandalia	5,567	27.3	2,810	26.1
O & M	3,487	17.1	523	4.8
Total	20,407	100.0	10,773	100.0

On dead freight the Vandalia alone had over its allotment. On live stock the Vandalia, the Indianapolis & St. Louis and the Chicago & Alton were all over their proportions.

Colorado-Utah Association.

At the meeting of this Association in Denver the agreement for the division of the Utah business was finally settled. The Colorado agreement was also completed with the exception of a few details, and both pools are renewed for a year.

Transcontinental Passenger Rates.

Cutting of passenger rates to Pacific coast points continues without much change. The latest rates reported, made by the Union Pacific, were $23 first-class and $15 second-class from Missouri River points to San Francisco. Tickets have been sold in New York at $39.50 first-class and $31.50 second-class to San Francisco, and the rates made from California points are quite as low, or lower, sales being reported of limited tickets in San Francisco at $16 to Chicago and $31 to New York. No standard can be reported, however, as changes are continually being made.

Transcontinental Freight Rates.

Freight rates to California points are entirely uncertain, and it is impossible to name any definite rate, as for the past week each road has been making its own rates, apparently at almost any figure which suited the convenience of the agents or the individual shippers. It is reported that both the Atchison and the Union Pacific are forcing rates down to the lowest point, in order to end the war as soon as possible. It is also reported that negotiations have already been begun for a settlement, but it is impossible to obtain a confirmation of these rumors. If anything has been done toward putting an end to the war by agreement it has been done very quietly.

Central Traffic Association.

The Central Traffic Association will hold a meeting in Chicago March 25, on call from Commissioner Blanchard. The points to be discussed are, in the freight department, the percentages to be reported by the committee, the practicability of making an additional traffic division to cover tonnage now passing eastward around Chicago, Peoria & St. Louis, and some matters of detail in relation to the expenses of the Association. The Commissioner will present a report as to the work already accomplished in the formation of traffic divisions and a contract governing them.

In the passenger department amendments to the passenger agreement will be considered and action, upon the restoration of rates and the methods which may best be adopted to maintain them. The payment of commissions and a basis for special and theatrical rates will also be considered.

Chicago Live Stock and Dressed Beef Shipments.

The following statistics, collected and compiled in Mr. Fink's office, give the shipments of cattle and dressed beef from Chicago to places east of the western termini of the trunk lines for six successive years, in tons:

Destination:	1880.	1881.	1882.	1883.	1884.	1885.
N. Y. City:						
Cattle	222,262	265,387	257,281	238,828	191,736	182,199
Dressed beef	.....	114	3,812	23,060	32,722	45,112
Boston:						
Cattle	81,914	96,222	59,391	75,639	54,845	39,931
Dressed beef	9,860	14,405	18,683	29,139	29,644	37,724
Philadelphia:						
Cattle	19,280	30,403	36,137	20,225	15,759	23,235
Dressed beef	.....	10	475	9,033	14,299	22,825
Baltimore:						
Cattle	4,053	3,807	5,085	8,167	6,211	6,916
Dressed beef	.....	.....	1,393	4,160	4,208	7,676
New Eng. States:						
Cattle	45,145	12,021	146	1,001	1,151	2,787
Dressed beef	20,845	29,227	38,627	52,936	53,666	60,252
New York State:						
Cattle	39,632	22,908	21,778	14,491	16,995	7,262
Dressed beef	.....	18	907	16,605	24,552	25,506
N. J. and Del.:						
Cattle	1,560	1,017	1,664	1,558	584	199
Dressed beef	.....	.....	630	6,237	10,619	14,041
Pennsylvania:						
Cattle	1,050	1,283	2,584	3,838	18,590	15,863
Dressed beef	.....	.....	370	5,893	8,746	9,438
Md. and South:						
Cattle	1,308	572	2,594	8,415	4,539	2,830
Dressed beef	.....	.....	878	2,577	5,545	7,701
Eastern Canada:						
Dressed beef	.....	.....	.....	.....	1,592	1,359
Total:						
Cattle	416,204	433,650	384,660	372,214	310,410	281,022
Dressed beef	30,705	43,774	65,775	149,640	184,993	231,634

Thus the dressed beef, which was less than 7 per cent. of the tonnage in 1880 and 9 per cent. in 1881, rose to 29 per cent. in 1883, 37⅛ in 1884, and 45 per cent. last year. Dressed beef supplies the larger part of the consumption of the interior Eastern towns except in Pennsylvania, and of the large cities only New York receives much more live cattle than dressed meat *from Chicago* (for great shipments of cattle are made from places east of Chicago, but no dressed beef). To New York last year Chicago sent four tons of cattle to one of beef; to Boston about 6 per cent. more cattle than beef; to Philadelphia nearly the same of both; to interior New England 22 of beef to one of cattle; to interior New York 3¾ of beef to one of cattle; to interior Pennsylvania 1¾ of cattle to one of beef. The total cattle receipts from Chicago have decreased steadily since 1881, while beef receipts have increased steadily.

RAILROAD LAW.

Injury to Employe—Contributory Negligence.

In the case of Folks against the Savannah, Florida & Western Co., the Georgia Supreme Court holds as follows:

Where the undisputed evidence showed that an engineer of a railroad company violated its rules furnished for his government in respect to passing switches and turnouts, and in respect to the speed at which trains should run and the precautions to be used by engineers to prevent collisions, and that a collision was occasioned in whole, or at least in large part from his negligence in this regard, and that such collision caused his death, a recovery by his widow against the railroad for his homicide was contrary to law and unsupported by the evidence, whether or not there was also negligence on the part of the company's employés on the other train with which the collision occurred.

Such violation of rules appearing from the evidence for the plaintiff, *semble* that a nonsuit should have been granted. Judgment reversed.

Damage to Goods in Transit—Liability of Last Carrier.

In the case of Wright against the East Tennessee, Virginia & Georgia Co., the Georgia Supreme Court decides as follows:

1. Where goods were shipped by steamer from Baltimore, Md., to Savannah, Ga., and thence by a connecting railroad to Brunswick, and on their arrival it appeared that a portion of the goods had been abstracted, and the railroad tendered their value, but this was refused, because the consignees also claimed damage to the goods from salt water during the voyage, which was contested:

Held, that the items for damage and for loss of goods were severable; and the tender was proper and should have been accepted.

2. Where it was conceded that the damage to the goods occurred during the ocean voyage and was complete before their delivery to the railroad, the liability of the latter to the consignees therefor would depend upon the contract of afreightment between the steamship company and the plaintiffs. If the steamship company was not liable, and the railroad company would have no recourse on it, the railroad company would not be liable to the consignees. * * * *

The verdict in excess of the shortage is contrary to law and unsupported by evidence, and is set aside for the amount of the shortage it must stand.

Injury to Person—Assuming Risks.

In the case of Eason against the Sabine & East Texas Co., appeal from Hardin County to the Texas Supreme Court, the plaintiff was in the employ of the owners of a saw-mill located near the line of defendant's road. For convenience in shipping lumber, the company had run a track out to the mill, and cars were left there for loading by the owners of the mill, when the engines of the company would come and carry the cars to the main track. The plaintiff's duty was to superintend the loading. While the train of defendant was on this track, two empty cars were near the end, one being derailed. Plaintiff requested the conductor to back his train and hitch on to these cars and pull them up to where they could be loaded with more ease. The conductor having but one brakeman, asked plaintiff to act for him, and couple the last or derailed car. In doing so he was injured, and negligence of the engineer is alleged. The demurrer to the petition was sustained in the lower court, on the ground that plaintiff, in performing the duty of brakeman, assumed all the risk incident to the position, and hence could not recover for an injury caused by the negligence of a fellow servant.

On the appeal the Supreme Court held that this is the law when the party is a mere volunteer. But the case is different when he acts at the time in furtherance of his own or his master's business. The principle upon which a recovery is allowed is this: The injured person is not a volunteer, but engaged at the request, or with the permission, of the company's agent in a transaction of interest as well to himself or his master as to the company, and this entitles him to the same protection against the negligence of the company's servants as if he were at the time attending to his own private affairs. Though performing a service beneficial to both, he is doing so in his own behalf, and not as the servant of the company. Their request or acquiescence gives him the right to perform the service, and the fact that he acts in his own behalf gives him a right to be protected. There was error in sustaining the demurrer. Reversed and remanded.

OLD AND NEW ROADS.

Annapolis & Baltimore Short Line.—Grading on this road is now about two-thirds completed, and work is being pushed with the object of finishing the road by May next. The rails have been ordered and will be delivered by the end of March, and the equipment has also been ordered. The grading of the road is generally light, the most expensive work being the long pile bridges over the Severn River and the West Branch of the Patapsco.

Atchison, Topeka & Santa Fe.—This company gives notice that immediately after the annual election, which is to be held in Topeka, Kan., April 15 next, a special meeting will be held for the purpose of ratifying, under the provisions of the Kansas law, passed by the Legislature at its last session, all existing agreements heretofore executed for leasing railroad, purchasing stock or bonds, or guaranteeing the bonds of other companies. Under the provision of the statute such ratification will take effect from the respective date of execution of such agreements or leases. The present action is intended to cover any possible charge of illegality which may be made.

Baltimore & Ohio.—A somewhat improbable rumor has found wide circulation this week, to the effect that this company has abandoned the Staten Island line and begun to build a road from Elizabeth, N. J., to the West Shore terminus at Weehawken. This probably started from the beginning of work on the West Shore branch from Weehawken toward Jersey City.

Canadian Pacific.—This company's statement of earnings and expenses for January is as follows:

	January, 1886.
Gross earnings	$500,358
Working expenses	453,977
Net profits	$46,381

"The decrease in net profits as compared with January, 1885, is $38,324. This decrease is due to the operation of 461 miles of new line around Lake Superior, which was only put in operation at the beginning of winter. The gross earnings for January include nothing for the transportation of construction material, as against $15,984 in January last year."

Canastota & Camden.—It is proposed to build a railroad from Canastota, N. Y., on the New York Central road, northward to Camden, passing around the east end of Oneida Lake. The road will be about 25 miles along. Several meetings have been held along the line and committees have been appointed to organize a company and secure the right of way and subscriptions to the stock.

Chautauqua Lake.—This company has secured the appointment of a board of commissioners by the Supreme Court, in order to decide on the question at issue with the Point Chautauqua Association. The company surveyed a line running along the edge of the lake and skirting the grounds of the Association. But the Association objected to this line very decidedly, and offered to give the road the right of way through its grounds at some distance from the lake. The company, however, claims that the line proposed by the Association would necessitate grades of 70 ft. to the mile, and would also give it a station at such an inconvenient point that all passenger business to the grounds will be thrown upon lake steamers, and the railroad would have no fair chance of competing with the boats. The Commissioner will hear testimony on both sides before presenting his report to the Court.

Cheyenne & Northern.—This company has been organized to build a railroad from Cheyenne, Wyo., to Fort Laramie, and thence northward to the northern line of the territory.

Chicago, Burlington & Northern.—A dispatch from Galena, Ill., says: "Judge Brown in the Circuit Court on Monday made his ruling on the motion of the attorneys of the Illinois Central to dismiss the suit brought against the latter to condemn lands belonging to it for right of way from Portage Curve to East Dubuque and overruled the motion. He also refused the motion of the attorneys for the Illinois Central for an injunction to restrain the Chicago, Burlington & Northern from prosecuting the case in the condemnation proceedings against the Illinois Central. The substance of Judge Brown's decision is that the Illinois Central's property could be condemned for the use of the public the same as though it belonged to an individual; that the lands asked for by the Chicago, Burlington & Northern are not used by the Central Co., and are not needed by them. A cross bill, the exact nature of which has not been fully disclosed, is to be filled by the Illinois Central Co. The Court on rendering its decision ordered the impaneling of a jury to assess the damages to be paid by the Chicago, Burlington & Northern for the right of way covering their condemnation proceedings."

Chicago & Northwestern.—The earnings and expenses for December and the seven months of the fiscal year from June 1 to Dec. 31 are reported as follows:

	December.		Seven months.	
	1885.	1884.	1885.	1884.
Earnings	$1,971,396	$1,951,745	$15,618,448	$14,819,445
Expenses	1,013,615	1,040,965	8,221,837	8,081,349
Net earnings	$957,781	$910,780	$7,396,611	$6,738,096

For the seven months the gross earnings increased $799,003, or 5.4 per cent., and the expenses $140,488, or 1.7 per cent., leaving a gain of $658,515, or 9.8 per cent., in net earnings.

Chicago, St. Louis & Pittsburgh.—At the annual meeting on March 17 the stockholders voted to authorize the issue of $2,000,000 new 5 per cent. bonds for the purpose of building a line from Richmond, Ind., by Hamilton, O., to Cincinnati. The surveys for this line are made and most of the right of way secured.

Cincinnati, Jackson & Mackinaw.—This company has been organized by the consolidation of the Cincinnati, Van Wert & Michigan Co., of Ohio, and the Jackson & Ohio Co., of Michigan. The last named company was organized to build the section of the road in Michigan. The company now has a completed line extending from Cecil, O., southward to Manchester, 98 miles, and contracts have been let for the extension from Manchester, southward to a connection with the Cincinnati, Hamilton & Dayton road. It is expected that a contract will also be let shortly for the extension from Cecil, north to the Michigan state line.

Cleveland & Canton.—The controversy between the two parties in this company continues active, and both sides claim the advantage. The opposition say that they have secured very nearly, if not quite, a majority of the preferred stock, and that they will be able to elect their own directors at the annual meeting in May. The present managers, on the other hand, claim to hold already one-third of the preferred stock in their own hands, and say that they will have no difficulty in securing enough to make a majority. The opposition have published a letter, stating that, in case of success, they intend to keep the office of the company in Boston, and have no intention of removing it to New York, as has been reported.

Cleveland, Youngstown & Pittsburgh.—The committee having in charge the reorganization of this company announces that over three-fourths of the bonds have now been deposited. Bondholders who desire to take part in the reorganization are requested to deposit their bonds with the Central Trust Co., in New York, by March 30 next.

Denver & Rio Grande Western.—The statement for the month of January is as follows:

Earnings	$66,584
Expenses	43,989
Net earnings	$22,595
Taxes, insurance and rent of equipment	5,011
Net balance	$17,584

In January, 1885, there was a deficit on operating of $7,178, against this year's surplus, showing a gain of $24,762 in the net balance for the month.

Eutawville.—This road is now completed from a junction with the South Carolina Railway at Forty-one-mile station, S. C., northward to Connor's, a distance of 15 miles. The stations are Harleyville, 4 miles from Forty-one; Peck's, 11; Holly Hill, 12; Connor's, 15 miles. Near Harleyville the road crosses the Four-hole swamp on a trestle bridge 1¼ miles long and from 5 to 15 ft. high. Grading is nearly completed to Eutawville, 18 miles from the starting point, and the road will be finished to that place in a few days. It is then proposed to run the road to Vance's Ferry on the Santee River, across to Sumter and thence north to the state line in the direction of Monroe, N. C. When completed the line will be 175 miles long. It is now of 5 ft. gauge, but will be changed to 4 ft. 9 in. in June.

Evansville, Knightstown & Toledo.—This company has been organized to build a railroad from Evansville, Ind., to Spiceland in Henry County, where it will connect with Ft. Wayne, Cincinnati & Louisville road.

Georgia Pacific.—Contracts have been let for grading nearly all of the gap in this road between Coalburg, Ala., and the present terminus of the Western Division at Day's Gap. Most of the contractors have already gone to work.

Gulf, Colorado & Santa Fe.—This company is pushing the extension of its line from Dallas, Tex., northward to the Red River. A considerable part of the distance is covered by an old grade built several years ago by the Chicago, Texas & Mexican Central Co., which is still in fair condition. Tracklaying has already been begun at Dallas.

In spite of the denials made by the officers of the company, it seems to be generally believed that the Galveston stockholders, who have heretofore controlled the road, are negotiating for a sale of their interest to parties representing the Atchison, Topeka & Santa Fe. Both companies have authority from Congress to build lines across the Indian Territory, and to secure these grants construction must be begun this year. It is evident that it will be to the advantage of both to join in the building of a single line, thus saving the amount which would be expended on the building of a second or parallel line, and securing to the Gulf road on the one hand a line northward and eastward in Kansas, and to the Atchison, on the other, a connection with a considerable system of road already completed in Texas. Without doubt negotiations are in progress for some agreement between the companies, but whether the transfer of the control of the Gulf road from Galveston to Boston be included is still doubtful.

Houston, East & West Texas.—It is reported that a syndicate of New York capitalists is now negotiating for the purchase of this road from the Bremond estate. The

road is now in the hands of a receiver principally on account of complications arising out of the death of the late Paul Bremond, who owned nearly all the stock. There is a debt of about $700,000 on the road, and it is said that the syndicate have offered $200.000 for the property, besides assuming this debt. The road extends from Houston, Tex., to the Sabine River at Logansport, a distance of 192 miles, and is of 3-ft. gauge. Should the syndicate conclude this purchase, they will also buy the Louisiana end of the line, extending from Logansport to Shreveport, 40 miles, which is owned by a separate company.

Long Island City & Sea Beach.—This company has filed articles of incorporation to build a railroad from Long Island City, through, or rather, around Brooklyn, to Fort Hamilton, with a branch from Flatbush to Canarsie. The total length of road to be built is 19 miles.

Louisville, Evansville & St. Louis.—The Receiver reports to the Court that his receipts for the month of January were $56,836. The expenditures for the month were $72,094, reducing the cash in hand, $54,867 on Jan. 1, to $39,609 at the close of the present month.

Memphis & Charleston.—The statement for January and the seven months of the fiscal year from July 1 to Jan. 31 is as follows:

	January.		Seven months.	
	1886.	1885.	1885-86.	1884-85
Earnings	$115,167	$141,366	$843,691	$914,947
Expenses	83,815	163,060	561,781	707 570
Net earnings	$31,352	*$21,694	$281,910	$207,377

*Deficit.

For the seven months the gross earnings decreased $71,256, or 7.8 per cent., and the expenses $145,789, or 20.6 per cent., the result being a gain of $74,533, or 36.0 per cent., in net earnings.

Mexican Railroad Notes.—The following notes are from the *Mexican Financier* of March 6:

The National Railway's Pacific Branch is expected to reach Pátzcuaro, May 1.

Mr. Theodore F. Brown having left the service of the Central Railway Co., Mr. Oscar C. Pratt has been appointed as acting agent at the uptown ticket and freight office in the Escandon building.

The Central Railway is doing a very heavy tourist business this season, some 200 visitors from the United States having arrived here *via* this line within a few days, while a large number of people are expected the coming week, several parties in private cars. A favorite winter and spring route is by sea to Havana and thence to Vera Cruz, and homeward *via* the Central, which now offers a greatly improve restaurant service and an excellent car equipment. We believe that tourist travel to Mexico has only begun, and look for a great increase next fall and during the spring of 1887.

The Tehuantepec Railway will, we believe, eventually become a reality and must prove a remunerative investment of capital. As we understand it, the settled policy of the Government is to retain the ownership of the road, although we can see no objection to the leasing and operation of the line by a company, foreign or domestic. For strategical reasons, the Tehuantepec road should be the property of the Government, but it is by no means essential that the Government itself should operate it. This road will give the rich state of Oaxaca rapid communication with the Gulf of Mexico and make valuable vast tracts of rich agricultural and forest land now comparatively worthless. If the Tehuantepec road had no other purpose than the opening up of Oaxaca, it would be worth all the money it cost.

Minneapolis, Sault Ste. Marie & Atlantic.—A dispatch from Minneapolis reports that this company has negotiated a loan of a sufficient amount to complete the extension of its road from the terminus in northern Wisconsin, through the upper peninsula of Michigan to the Sault Ste. Marie. The loan, it is said, has been obtained through the assistance of the Canadian Pacific Co., with which the line will make connection

Missouri Pacific.—The strike on this road still continues, with an almost complete stoppage of freight traffic, to the great embarrassment of business in the extensive region served by its lines. Passenger trains continue to run, at least those carrying the mails, without interference, although the St. Louis suburban and other local trains are stopped. The engineers and firemen have not joined in the strike. The chief event of the week has been the refusal of the officers of the company to hold a conference with the representatives of the Knights of Labor, who offered to submit and discuss their grievances.

The situation on March 17 is summed up in a dispatch from St. Louis as follows: "The 13th day of the Gould system strike opens with as little hope of a speedy resumption of freight traffic as ever. Suburban passenger traffic has been partly re-established, with the aid of policemen and deputy sheriffs, whose presence on the trains prevents the Knights of Labor from influencing the engineers to leave their trains, and the effort will, it is expected, be made to-day to run out all the suburban trains on their schedule time. Vice-President Hoxie's reply to Martin Irons, Chairman of the Knights of Labor Executive Committee, inclines many to the belief that the company will attempt no settlement with the strikers as a body, but that it will wait until the number of new men employed on the lines shall be sufficient to carry on its business. Should this prove to be true, it is understood by the Knights of Labor here that the order which called those out who are now striking will be followed by one which will cause every member of the order employed upon the Gould roads and their Southwestern connections to cease work. The situation so far as the East St. Louis switchmen is concerned remains unchanged. The men are at work as usual this morning, and it is understood that their grievances will be remedied without resort to a strike.

At the annual meeting in St. Louis last week the stockholders voted to authorize the directors to issue $6,000,000 additional stock, to pay for extensions or improvements. It was also voted to authorize the directors to issue in their discretion new bonds in place of the stock authorized or any part of it, provided that the total amount of stock and bonds so issued shall not exceed $6,000,000 in all.

Montana Central.—This company has completed surveys of a line extending from Helena, Mon., to Fort Benton on the Missouri River; and also from Helena to Red Mountain, a distance of 164 miles in all, and is now making preparations to commence work on these lines. The company purposes building in addition to its main line several branches to reach gold mining districts and coal mines, and it is also understood that part of its plan is an extension from Fort Benton eastward to the Dakota line, with the object of making connection with the St. Paul, Minneapolis & Manitoba road, which would be extended from Devil's Lake westward across Dakota to meet the Montana road.

Montana & Idaho.—This company has been organized to build a railroad from a connection with the Utah & Northern in Beaver Head County, Idaho, to Salmon City, with a branch northward to connect with the Oregon Railway & Navigation Co.'s line. Surveys for the road are now in progress.

Nantasket Beach.—Arrangements have been made for the lease of this road to the Old Colony Co., and a bill has been reported in the Massachusetts Legislature, which will legalize the lease. This action is considered necessary, as the road is now in possession of the bondholders, who bought it at foreclosure sale about two years ago. The road is a narrow-gauge line about 7 miles long, extending from a junction with the Old Colony road in Hingham, Mass., along the Nantasket beach, the most popular seaside resort of Boston.

New York, New Haven & Hartford.—This company has, without solicitation, decided to raise the pay on all divisions of the road from $1.35 to $1.50 per day, beginning with April 1.

Northern Pacific.—Work is now in progress on the extension of the Cascade Division to Ellensburg, Wash., 40 miles from North Yakima. There are 7 miles of track still to be laid, but it is expected this work will be completed by the end of the month. The tunnel on this division will be 9,850 ft. long, and it is supposed that the whole length will be through solid rock. The summit of the mountain is 1,180 ft. above the level of the tunnel, so that there will be no chance to make a shaft at the centre, and the work must be driven from the two ends entirely.

Pensacola & Memphis.—This company has been organized under a charter granted by the state of Mississippi to build a railroad from Grenada, Miss., southeast to Meridian, and thence to Pensacola, Fla. A considerable portion of the road will be in Alabama.

Philadelphia & Reading.—The Philadelphia *Ledger* of March 17 says: "The Reading Reconstruction Trustees held their final session yesterday, and received back the plan from the Morgan Syndicate, with the acceptance of the latter and their announcement that they were ready for the Trustees 'to issue the plan to those in interest and assume for the Syndicate the responsibilities therein agreed upon.' The Trustees thereupon approved the plan, with some corrections, and by a vote of six to one ordered it to be sent to their counsel to be prepared for publication, copies to be at the same time sent to the Reading Receivers and Managers. The vote of the Trustees was: Messrs. Garrett, Bartol, Shipley, West, Dupont and Cochran, yea, and Mr. Knight, nay. This matter, which has required both exemplary patience and unusual perseverance to accomplish, being now closed, it will probably require a few days longer to get the prospectus and various documents ready that are necessary before the plan can be formally presented to the Reading bond and share holders, and notice given to deposit their securities under it. The following is a synopsis of the document:

"The plan provides for creating a new 50-year general mortgage at 4 per cent. for $100,000,000. This is to be used as follows:

Reserved to cover bonds at maturity, of prior liens	$33,422,000
To pay general mortgage	24,686,000
General mortgage scrip and coupons	2,000,000
Real estate mortgages	2,100,000
Advances for 4 per cent. interest on general mortgage certificates issued for bonds deposited	3,000,000
To take up shares or bonds of leased lines, and for no other purpose	15,000,000
To exchange or redeem Coal & Iron Co. divisional mortgages, and for no other purpose	10,000,000
Total	$90,208,000

"This leaves $9,792,000 for use hereafter by the reorganized company, as a reserve for the improvement of the railway. No mortgage in addition to this is to be placed on the Reading properties for five years after the reorganization without the consent of a majority of the preferred stockholders. For additional means of reorganization four classes of stock are to be issued, known as preferred stock, income stock, consolidated stock and common stock. Under the plan the general mortgage bondholders are asked to deposit their bonds with overdue coupons with Drexel & Co., and receive therefor a certificate for the par value of the bonds, bearing 4 per cent. interest for three years, or until reorganization if sooner effected. These deposited bonds are to be placed with a trust company to be selected by the Trustees, so as to make the certificates negotiable at the Stock Exchange. The certificate holder will upon reorganization be entitled to receive for each $1,000 bond $1,000 new 4s and $480 preferred stock for the 6s and $500 preferred stock for the 7s. It is provided, however, that this right to exchange is not to accrue absolutely until after Jan. 1, 1887, the right being reserved in the meantime to pay off the general mortgage bonds principal and interest in cash. The Trustees are given power if the principal and interest of any of the securities deposited shall be tendered prior to Jan. 1, 1887, 'to transfer the same on receiving payment therefor, and distribute the proceeds, less expenses incurred hereunder, to the parties entitled thereto.' To accomplish this the junior bond and stockholders are to have the privilege until Aug. 1 to form a syndicate to make this payment, and be given in return all the securities that would otherwise go to the general mortgage bondholders. After Aug. 1 and until Jan. 1 the company is to have the right to make any feasible negotiation by selling these securities upon more advantageous terms and paying off the general mortgage with the proceeds. If neither of these options is exercised, then the plan goes into effect Jan. 1 by giving the general mortgage holders the new securities.

"The income mortgage and convertible adjustment scrip holders will pay 10 per cent. cash assessment and receive for each $1,000 bond and overdue coupons $100 preferred stock (for the assessment) and $1,000 income stock, with such additional income stock as equals the matured coupons at the time of reorganization. The first series 5s consols pay 10 per cent. assessment, and for each $1,000 bond and overdue coupons receive $100 preferred stock (for the assessment) and $1,000 consolidated stock, with additional stock to equal the matured coupons. The second series 5s pay 15 per cent. assessment, and for each $1,000 bonds and overdue coupons get $150 preferred stock (for the assessment), $250 consolidated stock and $750 common stock, with such additional consolidated and common stocks in that proportion as will equal the matured coupons. The convertible 7s and debentures of the railroad and the coal company pay 15 per cent. assessment, and the holder for each $1,000 bond and coupons gets $150 preferred stock (for the assessment) and $1,000 common stock, with additional stock to cover the coupons. All unsecured claims, when proven, whether funded or floating, get the same recognition as the debenture bonds. The present Reading preferred and common stock pays $10 per share assessment, receiving $10 preferred stock (for the assessment) and $50 common stock per share. The deferred income bonds pay 2½ per cent. assessment, and for each $1,000 bond receive $25 preferred stock and $200 common stock. Of the different classes of new stocks created, the preferred stock is to be given dividends up to 5 per cent., non-cumulative. The income and consolidated stocks are next to be entitled to dividends up to 5 per cent. non-cumulative. If in any year the net earnings are not sufficient to pay this, then 'the net earnings applicable to dividends of the properties on which the said income bonds and first and second series 5s respectively have liens prior to the general mortgage, as may be hereafter ascertained, shall be appropriated, as far as may be necessary, toward the payment of dividends respectively on the said two classes of income and consolidated stock.'

"For the protection of the creditors assenting to the plan the common stock of the new company shall be vested in J. Lowber Welsh, J. Pierpont Morgan, Henry Lewis, George F. Baer and Robert H. Sayre as Trustees, to be held and voted upon for five years, marketable certificates being issued for this stock. Brown Bros. & Co. have consented to act as depositaries for all the stock and securities other than the general mortgage bonds. The securities and assessments are to be deposited with a Trust Company in this city, to be selected by the Reconstruction Trustees, who also make a contract with John Lowber Welsh, J. Pierpont Morgan and John C. Bullitt, representing the Syndicate who subscribe $15,000,000, that the Syndicate shall be substituted in the place of any creditor or stockholder neglecting or refusing to pay the assessments prescribed by the plan, they agreeing to pay the assessments, for which they shall receive the securities to which the defaulting creditors or stockholders are entitled. Drexel & Co. shall issue negotiable 4 per cent. certicates to the general mortgage holders, pending reorganization, the interest payable semi-annually in advance for not exceeding three years from Jan. 1, 1886. In case of failure of the plan the deposited bonds with coupons are to be returned to the bearer of the certificate upon its surrender and the repayment of the interest paid thereon by Drexel & Co. The Syndicate are to advance necessary expenses and disbursements pending reorganization, which, with the general mortgage interest advances, will be refunded. The Syndicate are to be paid interest on these advances at the rate of 6 per cent. per annum, and a commission of 5 per cent. upon their $15,000,000 subscribed capital. Messrs. Samuel Dickson, John Lowber Welsh, Henry A. Dupont, Thomas Cochran and Harry F. West are made the Executive Committee to take charge of foreclosure proceedings and the purchase of the property, and to supervise reorganization. The board of Reconstruction Trustees are to be the sole judge whether enough signatures of creditors have been obtained to the plan to warrant them in carrying it out, and shall have power to abandon it whenever they deem proper. They may also limit the time of acceptance of the plan or extend such time at their discretion, and are also vested with the usual necessary powers in such cases."

Portland & Willamette Valley.—The grading of this road is now well advanced and the rails have been purchased and are now under way to Portland by water. The road extends from the Northern terminus of the Oregonian Railway, northward to Portland, Ore., and is built by the bondholders of the Oregonian road in order to give their line an outlet to a shipping port.

Ridgefield & New York.—At a meeting held this week the directors of this company resolved to begin work on the road and decided to let as soon as possible contracts for a section of 6 miles, extending from Portchester, N. Y., to Stanwich, Conn. A part of the grading on the road was done several years ago.

Rome, Watertown & Ogdensburg.—This company has concluded a lease by which it acquires trackage rights over the New York, Ontario & Western from Fulton to Oswego for a term of 35 years, with the privilege of renewal by arbitration for 15 years longer. Under this lease the Rome, Watertown & Ogdensburg has the right to run as many trains as it deems advisable, and on the business from Fulton station to Syracuse and other southern points it pays no trackage to the Ontario & Western. On business going over the line from Fulton to Oswego and points beyond, the mileage of the Ontario & Western, is fixed at 12 miles and the mileage of the Rome, Watertown & Ogdensburg at 1 mile more than actual mileage, and earnings of the Rome Co. on business going over the 12 miles are prorated on the constructive mileage, and from the amount earned on the 12 miles the Rome Co. retains 50 per cent. for doing the business. The Rome Co. is not restricted as to where it shall do business, or in the rates.

This section of the New York, Ontario & Western thus leased is used by the Rome, Watertown & Ogdensburg Co. as part of its leased Syracuse, Phœnixville & Oswego line, and the Rome Co. proposed building a separate line over that section, but will now abandon that intention.

St. Louis & Hannibal.—At the annual meeting of this company, March 10, the stockholders voted to authorize the issue of bonds to the amount of $600,000, to be secured by a mortgage on the road. The new bonds are to be used to cover the cost of the purchase at foreclosure sale and for the purpose of building two branches; one 10 miles long to the coal fields in Lincoln County, Mo., and one 4 miles long to the deposits of glass sand in Pike County.

Scioto Valley.—The holders of the consolidated mortgage bonds of this company have appointed Messrs. John W. Ellis, J. W. Archer, R. T. Colburn and Hugh L. Cole, of New York, and Evans L. Dietz, of Philadelphia, as a committee to protect their interest and to take whatever steps are necessary to reorganize the road.

Securities on the New York Stock Exchange.—The following securities have been admitted to dealings on the Stock Exchange:

Belleville & Carondelet, $485,000 first-mortgage 6 per cent. bonds.

Illinois Central, $1,500,000 new mortgage 4 per cent. bonds, having 65 years to run.

Shell Beach.—At the recent annual meeting in New Orleans, it was stated that the road bed had been much improved during the year, and an extension had been built to the works of the Poydras Planting & Manufacturing Co. The shops of the company at Shell Beach were destroyed by fire, but have been rebuilt. Two miles of the track have been relaid with steel. Preparations are now being made to change the gauge of the road from 5 ft. to 4 ft. 9 in., and the change will be made about June 1 at the same time with the other Southern roads. The question of extending the road down the Mississippi to Point à la Hache, a distance of 40 miles, was considered, but no definite action was taken. The earnings of the road for 1885 were $61,999; the expenses and interest on the bonds amounted to $56,868, leaving a surplus of $5,131.

Texas & Pacific.—The strikers on this road have not returned to work, but the running of all trains has been resumed, and the Receivers have obtained from the Court the services of United States marshals to prevent interference with the trains. Work has been resumed in the repair shops only to very limited extent, the chief strength of the strikers having been among the shopmen. For the present, however, there is no pressing need of the shops, although they will be required before long.

Toledo, Cincinnati & St. Louis.—Mr. S. H. Kneeland, of New York, as representative of the Purchasing Committee of bondholders which bought this road at foreclosure sale, has taken formal possession of the line. The Receiver is still continued in office in charge of the terminal property in Toledo, which was not included by the sale of the road, but the Court has directed that the purchasers shall be allowed the use of this property, pending the completion of the sale, on terms to be decided by the Court.

Troy & Greenfield.—The Hoosac Tunnel Committee of the Massachusetts Legislature is now considering a bill to re-enact the law passed last year providing for the sale of this road, including the Hoosac Tunnel. That law, it will be remembered, failed because no purchaser appeared. It provided for the sale of the State road and the tunnel to any corporation owning or operating a continuous line from the eastern terminus of the State road to Boston. An attempt is to be made to introduce changes in the present bill giving the Governor and Council greater liberty of choice, the law of last year having practically made the Fitchburg Co. the only qualified purchaser.

Union Pacific.—The land sales for February were 11,211 acres, for $56,810. For the two months ending Feb. 28 the total amount of sales were 21,598 acres, for $105,574; against 86,951 acres, for $214,880 in the corresponding period of last year.

Wabash, St. Louis & Pacific.—The Central Trust Co., trustee, has made application to the United States Circuit Court for an order permitting it to take possession of the St. Joseph & St. Louis road, which has been for some years operated by the Wabash under lease. The application is on the ground that the rental of the road has not been paid.

West Shore.—A connection is now being put in between the tracks of this road and the New York Central, at Fairport, N. Y. The new track will probably be completed this week, and the passenger trains will then run into Rochester on the Central tracks.

Some work is in progress on a branch from the Weehawken terminus toward Jersey City, which is understood to be intended for a connection with the Pennsylvania Railroad. This branch will cross the Erie branch to the Weehawken oil docks, and that company will oppose the crossing.

Willmar & Sioux Falls.—This company has been organized in Minnesota to build a railroad from Willmar, Minn., by way of Marshall and Pipestone, to Sioux Falls, Dak. The project is said to be favored by the St. Paul, Minneapolis & Manitoba Co as an extension of its Willmar Branch, now under construction.

Wisconsin Central.—The tracklayers on the Chicago extension are reported 70 miles from Schleisingerville and 6 miles southward of Burlington, Wis., the last point noted.

Negotiations, it is said, have been renewed with the Chicago, Milwaukee & St. Paul Co. in relation to the use of the terminal facilities in Milwaukee. Both parties, apparently, are inclined to compromise, and it is not unlikely that a friendly settlement may be reached.

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

	Page.		Page.
Baltimore & Philadelphia	15	N. Y., N. Haven & Hartford	13
Boston & Lowell	15	N. Y., Ontario & Western	86
Boston & Maine	23	N. Y., Providence & Boston	25
Boston & Providence	15	N. Y. Railroad Commission	33
Buffalo, N. Y. & Philadelphia	16	N. Y., Susquehanna & Wes'rn	139
Charlotte, Col. & Augusta	155	N. Y., West Shore & Buffalo	58
Cheshire	104	Norfolk & Western	104
Chicago & Alton	176	Northern Central	156
Cin., N. Orleans & Tex. Pacific	140	Norwich & Worcester	120
Cleveland & Canton	192	Northeastern (South Carolina)	16
Columbia & Greenville	174	Ohio & Mississippi	174
Columbus, Hocking Vy. & Tol.	192	Pennsylvania Railroad	175
Connecticut River	85	Peoria, Decatur & Evansville	192
Consolidation Coal Co.	139	Philadelphia & Reading	48
Del., Lacka. & Western	104, 155	Pittsburgh & Lake Erie	68
Denver & Rio Grande	129	Pittsburgh Junction	86
Fitchburg	68	Pitts., McK. & Youghiogheny	68
Housatonic	192	Portland & Ogdensburg	120
Huntingdon & Broad Top Mt.	120	Providence & Worcester	120
Illinois Central	177	Richmond & Alleghany	86
Lake Shore & Mich. So.	23	Richmond & Danville	85
Lehigh Coal & Navigation Co.	140	Richmond, Fred. & Potomac	86
Lehigh Valley	68	Rochester & Pittsburgh	86
Leh. & W ikes-Barre Coal Co	139	Rome, Wat. & Ogdensburg	85
Maine Central	68	St. L & San Francisco	192
Michigan Central	13	St. Paul & Duluth	155
Mil., Lake Shore & Western	191	Virginia Midland	139
Mississippi & Tennessee	120	Western Maryland	139
Natchez, Jackson & Col.	104	Western North Carolina	192
Naugatuck	26	Wilmington, Col. & Augusta	104
New London Northern	120	Wilmington & Weldon	104
N. Y. & New England	16	Worcester, Nashua & Roch.	191

Chicago, Milwaukee & St. Paul.

This company makes the following statement of its operations for the year ending Dec. 31, in advance of the issue of the full report:

	1885	1884.	Inc. or Dec.	P c.
Earnings	$24,413,272	$23,470 998	I. $942,274	4.0
Expenses	14,512,471	13,859,628	I. 652,843	4.7
Net earnings	$9,900.801	$9,611,370	I. $280,431	3.0
Other income	105,939	82,307	I. 23,632	29.0
Total	$10,006.740	$9.693 677	I. $313,063	3.2
Interest, etc	6,096,573	5,918,609	I. 177,964	3.0
Surplus	$3,910 167	$3.775,068	I. $135,099	3.6
Dividends	2,394,038	3,321,167	D. 927,129	28.0
Balance	$1,516,129	$453.901	I. $1 062,228	234.0

The dividends paid last year were 7 per cent. on preferred and 5 per cent. on common stock. In 1884 the dividends were 7 per cent. on all the stock.

South Carolina.

The company publishes the following statement for the year ending Dec. 31, in advance of the publication of the full report:

	1885.	1884.	Inc. or Dec.	P. c.
Earnings	$1,151,840	$1,233,292	D. $81,452	6 6
Expenses	823,084	850,568	D. 26,884	3 2
Net earnings	$328,156	$382,724	D. $54,568	14.2
Other income	30,271	5,880	I. 24,391	....
Total	$358,427	$388,604	D. $30,177	7.7
Charges	382,544	382,974	D. 430	0.1
Surplus or deficit	D. $24,117	S. $5,630	D. $29,747	..

The earnings last year were $4,663 gross and $1,329 net per mile; the expenses were 71.5 per cent. of gross earnings. The mileage was the same in both years. Charges do not include interest on the income bonds.

New Haven & Northampton.

This company owns a line from New Haven, Conn., to Conway Junction, Mass., 94½ miles, and its trains use the Troy & Greenfield track from Conway Junction to North Adams, 28½ miles. It owns branches from Farmington, Conn., to New Hartford, 14 miles; from Northampton, Mass., to Williamsburg, 7½ miles, and from South Deerfield, Mass., to Turner's Falls, 10 miles. It leases the Holyoke & Westfield road, from Westfield, Mass., to Holyoke, 14¼ miles, making a total of 126 miles owned and 169 miles worked. The report is for the year ending Sept. 30.

A controlling interest in the stock is now owned by the New York, New Haven & Hartford Co., but the road is worked under its separate organization.

The general balance sheet, condensed, is as follows:

Capital stock		$2,460,000
Funded debt		3,200.000
Bills payable		749.500
Accounts payable and October coupons		109 628
Profit and loss		391,802
Total		$6.910.930
Road and equipment	$6,560,995	
Real estate	19.373	
Stocks and bonds owned	80,000	
Sinking fund	67,300	
Materials on hand	69,853	
Accounts receivable	91,123	
Cash	22,086	
		6,910,930

The funded debt includes $1,300,000 first-mortgage 7s; $1,200,000 consolidated 6s and $700,000 Northern Extension 5s, the interest charge being $198,000 yearly. There was no change in stock or bonds during the year.

The earnings for the year were as follows:

	1884-85.	1883-84.	Inc or Dec	P c.
Freight trains	$548,774	$573,842	D. $25,068	4.4
Passenger trains	220,097	239,434	D. 9,737	4 1
Rents, etc	21,213	22,538	D. 1,325	5.9
Total	$790.684	$8 5,814	D. $36,130	4 3
Expenses	504,492	541,613	D. 37,121	6.8
Net earnings	$295,192	$294.201	I. $991	0.3
Gross earn. per mile	4,732	4,946	D. 214	4.3
Net " "	1,747	1,741	I. 6	0.3
Per cent. of exps	63.1	64.8	D. 1.7	...

Taxes are not included in expenses. All expenditures made for improvements and additions to property are charged to the operating expenses for the year. The small gain in net earnings was due entirely to the reduction in expenses.

The income account for the year was as follows:

Net earnings, as above		$295,192
Balance from previous year		93,790
Interest and dividends received		4,415
Coupons unpaid		890
Bills payable		80,500
Total		$474.787
Taxes	$23,903	
Interest	238.217	
Rental Holyoke & Westfield	28,256	
Construction account, Northern Division	3,030	
Bills, accounts and balances payable	151,871	
Increase in materials on hand	7,424	
		452,701
Balance, cash on hand		$22,086

There was paid for land damages for the Northern Extension $3,030 last year, which completes the payments on that account, making the total cost of the extension up to Sept. 30 last $1,451,950 in all.

The traffic for the year was as follows:

	1884-85.	1883-84.	Inc. or Dec.	P c
Train miles	678,584	677,186	I. 1,398	0.2
Passengers carried	490.453	494,286	D. 3,833	0 8
Passenger-miles	8,723,359	8,773,296	D. 49 937	0.6
Tons freight carried	448,714	491,217	D. 42,503	8.6
Ton-miles	24,232,389	27,295,988	D. 3,063,599	11.2
Average rate:				
Per passenger-mile	2.30 cts.	2.44 cts.	D. 0.14 ct.	5.7
Per ton-mile	2.22 "	2.10 "	I. 0.12 "	5.7

There was no serious accident or damage to trains during the year.

The report says: "There have been laid in the track 800 tons of steel rails, which, with 800 tons delivered since the close of the fiscal year, will complete the change from iron to steel of the entire track on the main line and branches.

"Several small bridges have been renewed with iron, and the large wooden bridge over Farmington River on the main line is under contract to be rebuilt with iron and will be completed early in the current year. For this work a considerable sum has already been expended for change of grade and masonry.

Cleveland, Columbus, Cincinnati & Indianapolis.

This company owns lines from Cleveland, O., to Columbus, 138 miles; Delaware, O., to Springfield, 50 miles, and Gallion, O., to Indianapolis, 203 miles; a total of 391 miles. The report is for the year ending Dec. 31.

The company also leases the Mt. Gilead Short Line, from Levering, O., to Mt. Gilead, 2 miles. It leases and practically owns the Cincinnati & Springfield, from Springfield to Cincinnati, 80½ miles. It owns the Indianapolis & St. Louis, from Indianapolis to Terre Haute, 72 miles, and, through that organization, leases the St. Louis, Alton & Terre Haute, from Terre Haute to East St. Louis, 189 miles, with a branch to Alton, 4 miles. This makes 347½ miles leased and controlled, but the earnings and operations of these lines are given in the report separately.

The equipment consists of 160 locomotives; 86 passsenger, and 24 baggage and mail cars; 2,592 box, 557 stock, 561 flat 1,301 coal and 60 caboose cars; 1 directors' car, 1 pay car and 19 road and service cars.

The general balance sheet, condensed, is as follows:

Stock ($15,000,000, less $8,400 owned by Co.)		$14 991,600
Funded debt		10,517,000
Current liabilities		629,195
Income account, balance		3,594,455
Total		$29,732.250
Road and property	$19,627,536	
Cin. & Springfield, securities and advances	3,295,167	
Ind. & St L. " "	5,452,872	
Other property and securities	227.086	
Materials and fuel	219 083	
Accounts receivable	562,455	
Cash	348,051	
		29,732,250

From this it appears that the 391 miles owned stand on the books at $50,198 per mile, while the Cincinnati & Springfield has cost the company $40,934 and the Indianapolis & St. Louis $75,374 per mile. The funded debt includes $299,000 Bellefontaine & Indiana firsts; $3,000,000 general firsts; $4,013,000 first consols and $3,205,000 general consols. Last year $20,000 Bellefontaine & Indiana and $4,000 first consols were redeemed; $20,000 first consols and $1,705,000 general consols were sold, making a net increase of $1,701,000 in funded debt.

The figures for earnings and traffic given below refer only to the 391 miles of road owned.

The earnings for the year were as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Freight	$2,471,863	$2.518.873	D. $47,010	1.8
Passenger	797,079	899,435	D. 101,756	11 3
Mail and express	186,865	182.038	I. 4.827	2 7
Rents, etc	213.032	211,397	I. 1,635	0.8
Total	$3,669,439	$3,811 743	D. $142,304	3.7
Expenses	2,093,561	2,756,749	D. 63,188	2.3
Net earnings	$975,878	$1,054.994	D. $79,116	7.5
Gross earn. per mile	9,385	9,749	D. 364	3.7
Net " " "	2,496	2.698	D. 202	7.5
Per cent. of exps	73.4	72.3	I. 1.1	..

Taxes are not included in expenses. During the year there were 5,452 tons steel rails and 200,132 new ties used in renewals; 4.92 miles of new sidings were built and many improvements made in track, bridges and buildings.

The result of the year was as follows:

Net earnings, as above		$975,878
Taxes	$118,622	
Interest on bonds	659.385	
Interest and exchange	79,896	
		857,903
Profit on C., C., C. & I		$117,975
Loss on Cin. & Springfield	$174,829	
" " Indianapolis & St. Louis	500,591	
		675.420
Deficit for the year		$557,445

In addition to this deficit there was expended for new equipment $155,208, and for land, new sidings, etc., $21,936, making a total of $177,144 for additions to property.

The earnings of the road owned and leased lines (736 miles), given in complete form for the first time in the report, were:

Freight	$4,250,393
Passengers	1,578.386
Other sources	582,666
Total ($8,705 per mile)	$6,411,445
Expenses (76 9 per cent.)	4,929,274
Net earnings ($2,012 per mile)	$1,482,171
Taxes, interest and rentals	2,039,616
Deficit for the year	$557,445

The earnings of the Mt. Gilead Short Line (not included above) were $4,480 ($2,240 per mile) and the expenses $8,461 (188.9 per cent.), leaving a deficit of $3,981 for the year.

The traffic for the year (on the line owned) was as follows:

	1885.	1884.	Inc. or Dec.	P. c.
Pass. train-miles	1,271,375	1,188 323	I. 83 052	7.0
Freight " "	2,019,519	1,943,226	I. 76,293	4.0
Total loco. miles	4,779,815	4,567,950	I. 211,865	4 4
Passengers carried	820,607	938,047	D. 118,040	12.6
Passenger-miles	38,145,360	42,176,610	D. 4,031,250	9.6
Tons freight carried	2 513,780	2,347,792	I. 165,988	7.1
Ton-miles	428 691,881	397,678,278	I. 31,013,603	7.8
Av. train load:				
Passengers, No.	30.0	36.0	D. 6.0	16.7
Freight, tons	212.3	205.0	I. 7.3	3.6

Locomotive service cost last year 12.24 cents per mile run, a decrease of 1.60 cents. Locomotives ran 1.45 miles to each revenue train-mile.

The earnings and expenses per unit of traffic were as follows, in cents:

	Per pass. mile.		Per ton-mile.	
	1885.	1884.	1885.	1884.
Through	1.605	1.731	0.463	0.525
Local	2.572	2 470	1.039	1.018
Average of all	2.091	2.133	0 577	0.633
Cost	1.829	1.669	0.466	0.516
Net earnings	0.262	0.464	0.111	0.117

The decrease in the average rate per passenger-mile was 0.042 cent., or 1.9 per cent.; per ton-mile, 0.056 cent., or 8.8 per cent. Of the total freight traffic last year 67.9 per cent. was through and 32.1 local; 63.3 per cent. east-bound and 36.7 west-bound.

President Devereux says in his report: "For most of the year a disastrous competition and conflict has obtained in the carriage of all-rail traffic, and the lowest point in rail rates between the Mississippi Valley and the seaboard has been reached. The average gross freight rate is 0.577 cent per ton-mile compared with 0.633 cent in 1884, a decrease of 8.84 per cent. on the extraordinary low figures of the preceding year, and the cost freight rate for the year is 0.466 cent compared with 0.516 cent in 1884, a decrease of 9.68 per cent.

"The tonnage movement and the amount of passenger traffic has been fair in volume, but rates have been torn and attenuated to the last degree apparently, and the work of the year has in consequence been barren of net revenue. It may be needful that such severe experiences continue, but the time must come when the destruction and demoralization of unrestrained and unlicensed competition in railroad tariff rates is to be restrained by law Due, proper and full accountability on the one hand as a public servant is to be required of the railroad, but a fair and reasonable protection should be rendered in its enforcement of just rates. * * *

"The bonded debt of the company has been increased during the year by $1,701,000, and now stands at $10,517,000.

"The company is free from floating debt, and its property was never in better physical condition, the roads and their equipment having been fully maintained to standard."

CINCINNATI & SPRINGFIELD.

The equipment of this line (80½ miles) consists of 16 locomotives; 14 passenger and 8 baggage and mail cars; 261 freight cars.

The income for the year was as follows:

Freight	$500,697
Passengers	341,753
Other	40.054
Total ($11,008 per mile)	$886,1 4
Expenses (78.2 per cent.)	692.541
Net earnings ($2,405 per mile)	$193,563
Taxes, interest and rentals	368,392
Deficit for the year	$174.829

Renewals included 1,218 tons steel rails and 38,502 ties, with the usual repairs of bridges, etc.

INDIANAPOLIS & ST. LOUIS.

The equipment of this line includes 49 locomotives; 21 passenger and 13 baggage and mail cars; 835 box, 162 stock, 117 flat, 517 coal and 25 caboose cars; 8 working cars.

Passenger trains ran 712,256 miles, and freight trains 1,152,017. The total locomotive mileage was 2,354,539 miles, at a cost of 13.39 cents per mile.

The earnings of the line (265 miles) were as follows:

Freight		$1,277,833
Passengers		435,954
Other		142,115
Total ($7,003 per mile)		$1,855,902
Expenses (83.2 per cent)		1,543,172
Net earnings ($1.184 per mile)		$312,730
Taxes	$63,483	
Rental St. L., Alton & Terre Haute	450.000	
Interest on bonds	170,000	
Interest and exchange	129,838	
		813,321
Deficit for the year		$500,591

Renewals included 3,105 tons steel rails and 125,067 new ties; this leaves only 8 miles of iron rails in the main track between Indianapolis and East St. Louis. There were 5.40 miles of new sidings laid; 10 spans of new iron bridge were put in. The equipment was fully maintained and was increased by 1 passenger and 2 caboose cars.